Issue No. 13

June 1957

AIR COOLED NEWS

PUBLICATION OF

THE H. H. FRANKLIN CLUB

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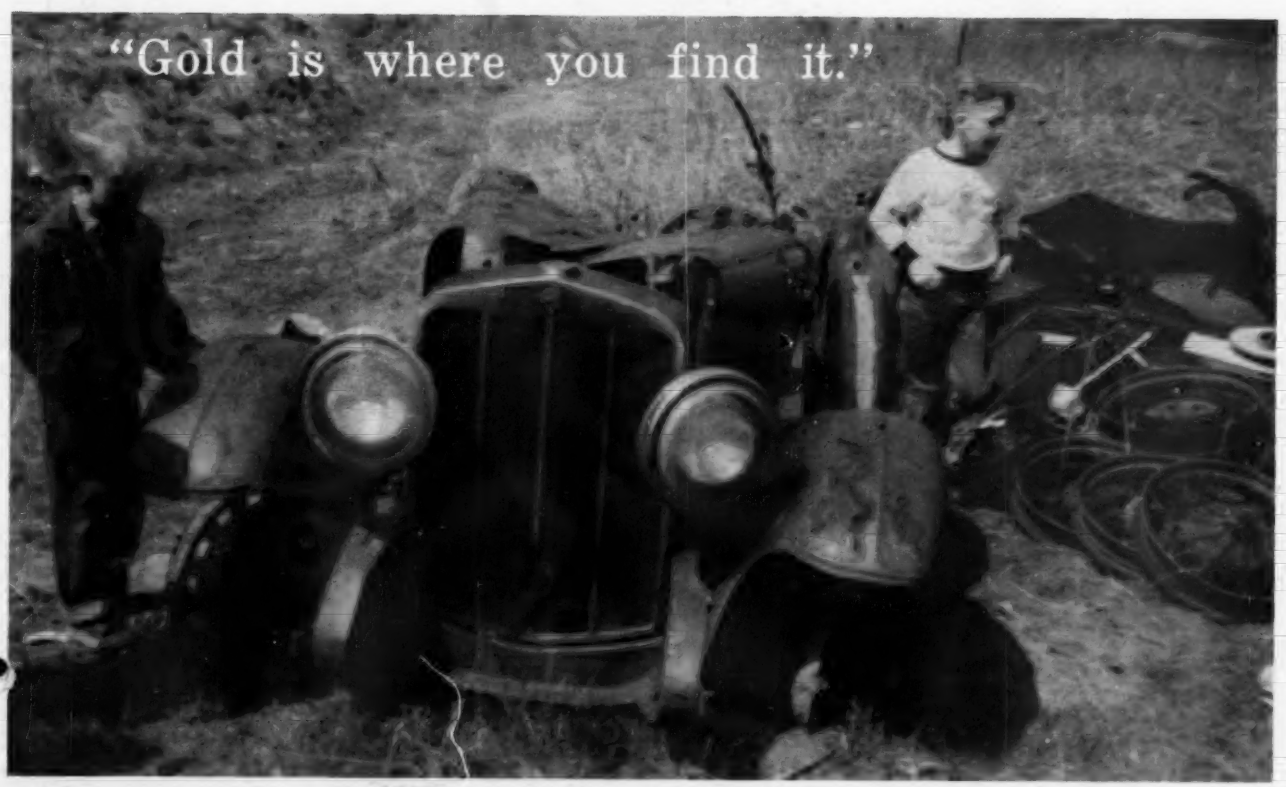

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AIR COOLED NEWS

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THE H. H. FRANKLIN CLUB

VOL. V, No. 1 JUNE 1957

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This issue is printed on an ANTIQUE style stock. We were fortunate in being able to secure this much richer paper with no increase whatever in the cost of the magazine. We ran several samples of the last issue on this stock for direct comparison, the improvement was outstanding, softer tones in the pictures and much easier to read. We think it is a wonderful improvement in the appearance of the magazine. We hope you like it.

The picture on the opposite page represents an important event in the annals of the Club. Nelson and Morzella Reynolds, the First President and the First Correspondent of the First Region of The HHFC. George Macauley and Ronald Andrew, the back seat drivers from a different area, are well known to lots of Trek regulars.

Now that an HHFC Region has been setup and that others are in process of being organized the Franklin man can look forward to more and more activity within his own Club. This is fine and as it should be.

In determining the rules under which our Regions might be organized the proposers of the Amendment that made these possible wisely took into account one of our original policies that has helped to account for our friendly acceptance by the larger and older clubs. The basic principle that HHFC will cooperate with and will not compete with the general old car clubs, should be adhered to as closely as possible. While it is desirable to expand our activities so that more and more HHFC people may be enabled to gather together from time to time, it is also highly desirable that these gatherings be planned either in conjunction with major events or with the least possible interference with other activities. This we believe is being accomplished.

Our Club affords certain advantages and services to a Franklin man that cannot be supplied by organizations devoted to all makes of cars. This is good. On the other hand these larger and nonspecialized clubs in their turn offer many things that we cannot do or do not desire to do.

By all means let us remain true to our belief that Franklin is THE CAR, but we are missing much of the pleasure that any old car can give if we do not also engage in these wider activities. The three major clubs all have much to offer us in added pleasure from our Franklins. These clubs, while devoted to the one general cause, differ widely in their make up and activities. The Antique Automobile Club, The Horseless Carriage Club and the Veteran Motor Car Club, all have been cooperative and friendly towards us. Membership in any or all of these organizations will be as rewarding to a Franklin man as to the devotee of any other make.

As we have several times stated it is the long range program of ACN to try to bring out every facet of the Franklin story. Certainly one of the elements that had a far reaching, even ultimate, effect was the "blood supply" of the Company and the final stopping of the "heart" when that supply was no longer adequate.

Member Harold M. Finley, Investment Officer for the Chicago Title and Trust Company undertook to delve into that part of the history for us. The result, published in this issue, is, we think, a most remarkable article. While an unprejudiced account guided by his experience as an investment counselor it shows all the way through his great love for the car and his understanding of the character of the Franklin personnel throughout the years. His conclusions, modestly but possibly correctly, are attributed by him to the vast wisdom achieved through hindsight. We think his feeling for a fine car and a wonderful organization are beautifully expressed in his concluding paragraph.

We believe that this Club is doing something worthwhile in gathering in and recording the scattered history of one of the country's well known automobiles as well as preserving hundreds of examples of that company's many interesting cars. Other people are doing a like thing for other makes of cars and the larger clubs are attempting a recording of the entire story. This is all good and we think should be supported. Let us continue to carry on this worthwhile objective, but above all, in the process, let us keep it a hobby and not look upon it as some stuffy sacred cause.

The automobile has a history of around sixty years in this country, speaking generally and not pedantically (We rate the pedant high among the more obnoxious types of men), a relatively brief span in an historical sense, yet already much of its story is lost for all time except as we and other like organizations may again bring it to the light. We, as a group, are rather fantastically devoted to this one make of car, that also is good, it is the whole structure of our club. Let us attempt, in so far as man can, to bring out the story as truthfully as possible. Franklin was a wonderful car, it was not perfect, it had faults. If these faults were heavily outweighed by advantages, as we think they were, then it was a fine car.

We believe that historically it was an important car. The whole history of automobile advancement could not be correctly

written without noting some of the innovations brought about by Franklin. The same may, of course, be said of many other cars. The automobile has changed America as nothing before it ever did. Regardless of who was first with this or that, though such matters usually interest all of us, this editor believes, without any reservations, that the car that has had the greatest influence in bringing about these decided changes in our ways, **the most important car of all time,** was the lowly Model T.

There seemed to be considerable interest in the story of the British Robinson air cooled car that appeared in the October 1956 number. We have decided to print a series of short articles on other interesting makes of air coolers. We think these cars are very interesting in themselves and doubly so in their comparison with Franklin theories and practice.

The current story is on the air cooled Chevrolet. The withdrawal of this car from the market is usually explained by one of two versions, one is that they were unable to overcome certain technical difficulties that stood in their way because of insufficient experience in the field, the other is that they got in the way of Franklin patents. The story by Carl Doman in this issue finally lays these myths of thirty odd years and gives the true version of why the Chevrolet disappeared from the scene.

Member Fred Moscovics has written us a short on the Frayer-Miller which we plan to publish in the next issue along with the barest high spots of his own distinguished career. Another member has been charged with digging out the data on the Ford air cooler, that few people knew ever existed. Mr. E. S. Cameron of New York, now in retirement, has furnished us with ample material for an article on his well known, but unusual air cooled engines. These, and possibly others, will appear from time to time. They should help to increase our understanding of Franklin and the whole field of air cooling.

In no circles that we can recall at the moment have we been hailed as the final arbiter of what is right and proper and what is in good taste. We are unembarressed by this so venture to record our views on many subjects connected with antique automobiles.

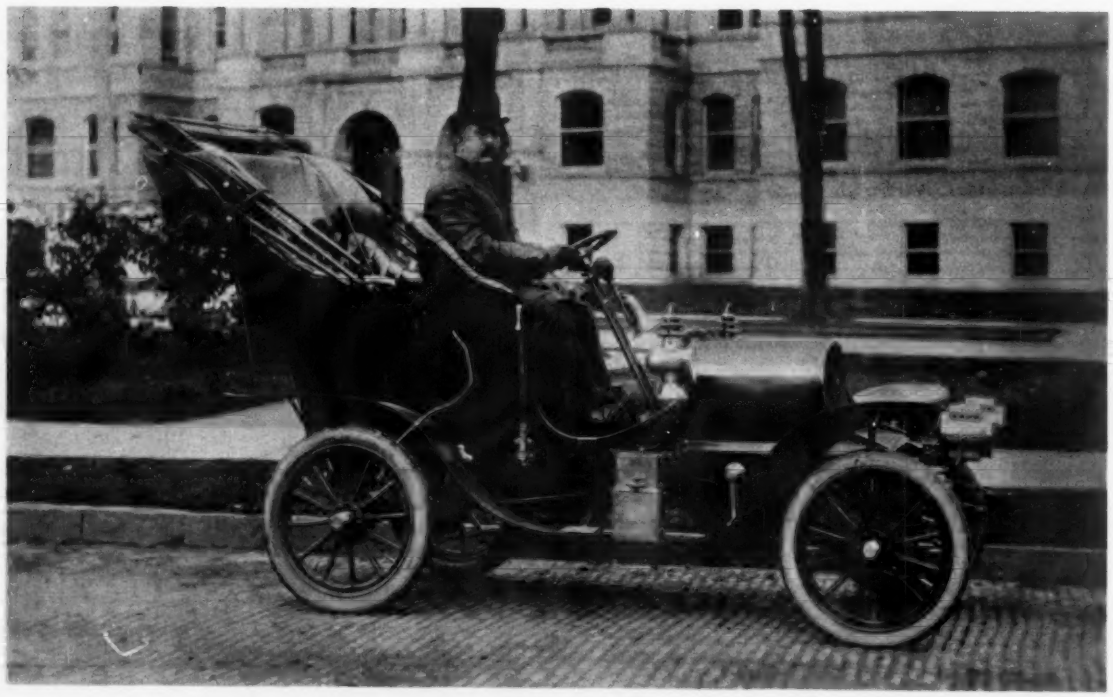
There is one group in particular that rates no praise from us. We refer emphatically to the collectors, or hoarders if you wish, of lamps, horns and similar essential accessories. We do not refer to those who may treasure an odd lamp or horn as, possibly, their first step in the hobby. We mean those who accumulate great stores of lamps and those other items so absolutely essential to the final restoration of many fine old cars. The result is long rows of hanging lamps, usually dingy from the arduous, and hence neglected, chore of keeping them polished, while other people are forced to drive their otherwise beautifully restored cars without them or to pay prices all out of reason to secure them.

There is absolutely no question here of anyone's rights in these matters and business is still business. But it is our consdered opinion that the question of good taste and especially sportsmanship is involved. With those who are frankly in the buying and selling end of antique cars we have no quarrel, our criticism is directed at those who assume the standing of amateurs and profess great love for the sport. With a little broader viewpoint they could do much to further the hobby. We would expect no one to accept financial loss on the items he may have acquired but to break up these dingy hoards so that they might once more appear where they belong, on the brackets of fine old cars, would be a gracious and worthwhile gesture of inestimable value to the sport.

We knew a gentleman who was, so he claimed, a political independent, he cared nothing for Party, merely selected and voted for the "best man". He always stated that, "It is no fault of mine that the Democrats always put up the best man." We knew another man who, though his own political philosophy was Democratic, did a passable job as editor of a Republican newspaper. We may question the depth of his personal ethics but at least he was seriously trying to do the job he had accepted.

This is not the prelude to an attempt to put ACN into politics. It is merely that the above two gentlemen somewhat represent the spot in which this editor has been placed. A man whose personal "politics" favors the Antiques over the Classics must try to put out a magazine for a Club that recognizes no "favourite Sons". A previous editor from the "opposition Party" managed to do it pretty successfully.

When the "electorate finally turns this rascal out of office", we think we'll form a Cross Engine Region. Maybe we can be elected Cross Head.



Dr. William F. Smith of Syracuse and his Model F, taken around 1905
Courtesy Onondaga Historical Association

Development of the Franklin *Direct Air-Cooled* Engine

Annual Meeting Paper

By E. S. Marks[1] *and* C. T. Doman[2]

FEATURES of the design of the various cylinders built by the Franklin organization in its development program leading up to the present design are discussed in this paper. The relation of waste heat to cooling-fin areas and cooling-blast velocities is shown and discussed for cylinders up to 3½-in. bore.

Characteristics of the cooling system, including fan, fan housing and air housings, are discussed at length, and the authors contend that no more power, if as much, will be absorbed in the cooling system as in that of the indirect air-cooled engine. Results of tests showing the ability of the engine to cool under the severest conditions of load and temperature are given.

Since the quietness of any engine is dependent upon constant valve-clearances, the authors describe in detail the method followed in the Franklin design to maintain at less than 0.003 in. any variation in clearance. A careful analysis is made for each part in the valve-gear mechanism that is affected by expansion.

Power curves of earlier engines built by the company are compared with the present-production powerplant. Without a change in piston displacement, the brake horsepower at 3500 r.p.m. has been increased by 76 per cent. This increase has resulted from (*a*) better cooling characteristics of the cylinder, (*b*) increased valve area, (*c*) decreased absorption of power by the fan and (*d*) increased compression-ratio.

FUNDAMENTALLY, all automotive engines are air-cooled. Yet, as engineers, we are most likely to designate the type of cooling by either "water-cooled" or "air-cooled." More correctly, we should use "indirect air-cooled" for the conventional type, or "direct air-cooled" when referring to engines cooled without an added medium. To this latter class the Franklin engine belongs.

In the past the direct air-cooled engine was handicapped by the fact that the power output was limited by inability to cool the cylinder properly. Consequently it was assured that, if a cylinder which had satisfactory heat-dissipating characteristics were developed, a power output comparable with that of the indirect air-cooled type of cylinder would be obtained. This paper deals with the development of a cylinder capable of delivering power output and of dissipating waste heat as well as, if not better than, the indirect or water-cooled type.

Experimental Cylinders

Fig. 1 shows the conventional cylinder as used on Franklin engines up to the introduction of the present type of side-draft cooling. This cylinder has a cast-iron barrel with fins cast in place on the first engines and arc-welded in place on later engines. Prior to 1925 the cooling fins were of steel. However, in that year a foundry method was devised for satisfactorily casting-in copper fins. This type of cylinder, of 3½-in. bore and 4¾-in. stroke, used 114 fins each 0.05 in. thick, this thickness and fin number having been found to dissipate the greatest quantity of heat with a given air-flow. The path of the cooling air, as indicated by arrows in the drawing, is first directed by air deflectors onto the head and then down the fin cells.

With this design the cylinder-head lacked sufficient cooling area to dissipate any great quantity of heat without resorting to high head-temperatures. High head-temperatures resulted, however, in excessive exhaust-valve and exhaust-valve-guide temperatures. Temperatures of 800 deg. fahr., measured in the bridge between the valves, were not uncommon under continuous wide-open-throttle operation. Furthermore, even had it been possible to cool the cylinder, the breathing capacity of the engine was limited by the valve sizes. Since the total of the diameters of the two valves plus the bridge thickness could not be greater than the cylinder bore, small valves were a necessity. Consequently, the conclusion was reached that an entirely new design, combining increased cooling ability with increased valve sizes, was necessary.

The first step in this development program is shown in Fig. 2. This cylinder was built with a detachable aluminum head which carried a large exhaust-valve. The cylinder barrel carried the intake valve. Studying this figure carefully, one can see the difficulties that might and, in fact, did arise. The cooling blast was directed to the various cylinders only by using a complicated system of deflectors, and then passed into the copper-fin cells on the barrel by a series of contortions. This tortuous air-path resulted in a system of very high resistance which severely lowered the fan efficiency. The whole story of this engine was one of grief. Cylinder-head gaskets could not be kept tight; valve clearances varied from 0.005 to 0.050 in.; the cylinder barrel around the intake valve became hot and distorted; and the cooling fan required excessive power to push the necessary air-flow through the restricted passage. Yet, with all these disappointments, the engine showed that increased power could be obtained by increased valve areas. Furthermore, had we then had the foresight to use a side-blast type of cooling, this engine would without doubt have shown remarkable performance. Experiments were continued with it for a time but were later abandoned for the cylinder type shown in Fig. 3.

The design in Fig. 3 followed former Franklin prac-

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[2] M.S.A.E.—Research engineer, H. H. Franklin Mfg. Co., Syracuse, N. Y.

tice in a general way except that the cylinder-head was removable, carried valves of generous size and was literally covered with cast-in copper fins. Power tests showed exceptionally high output until the fan drive was taken into account. Again the high resistance of the air passage resulted in excessive power absorption by the fan. The results therefore indicated that the successful design must incorporate not only increased cooling ability and increased valve areas but a third factor; that is, an air circuit of low resistance. These conclusions led to the design shown in Fig. 4.

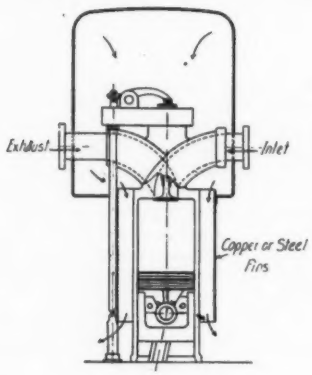


Fig. 1

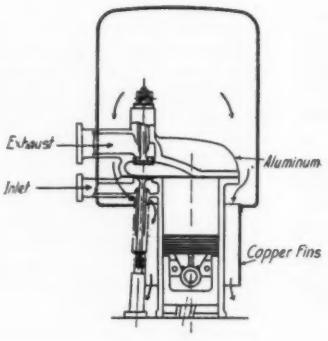


Fig. 2

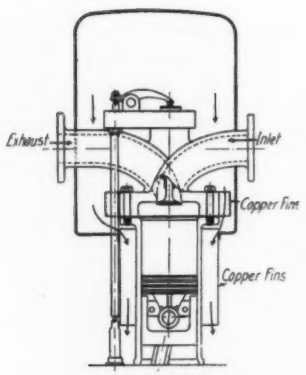


Fig. 3

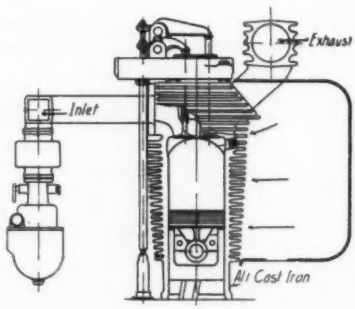


Fig. 4

Fig. 1 — Conventional Down-Draft Cylinder Used from 1909 up to Introduction of Side-Draft Cooling. The Vertical Cooling-Fins Were of Steel until 1925, When Cast-in Copper Fins Were Introduced

Fig. 2—Experimental Cylinder with Detachable Aluminum Head, Which Was the First Step in the New Program. The Tortuous Path of the Cooling Blast Caused Many Troubles

Fig. 3—Side-Blast Cylinder with Removable Cast-Iron Head and Large-Sized Valves. This Developed High Power-Output Except for Excessive Power-Consumption by the Fan, Showing the Need for a Low-Resistance Air Circuit

Fig. 4—First Side-Blast Design Departing Greatly from Earlier Designs but Returning to Horizontal Fins Used on Earliest Franklin Engines. Experience with This All-Cast-Iron Cylinder Led to the All-Aluminum Cylinder Having a Shrunk-in Cast-Iron Liner

STEPS IN DEVELOPMENT OF THE NEW FRANKLIN AIR-COOLED CYLINDER

This design is seen to depart greatly from those already discussed, yet the horizontal cooling fins were used on the company's earliest engines and later abandoned for the radial or vertical type of fin. This was an all-cast-iron cylinder. The valves were arranged at 45 deg. to the longitudinal axis of the engine and were of necessity small. Continuous-load tests showed this engine to have low power-output and that the cylinder was not capable of dissipating sufficient heat. Troubles were experienced from hot-spots and sticking pistons. The experience with this cylinder led to the decision to try an all-aluminum cylinder having a shrunk-in cast-iron liner, which is shown in Fig. 5.

This cylinder cooled very satisfactorily and demonstrated that cast iron must be eliminated as a cylinder-head material for a high-capacity engine and that aluminum held most promise. The power output, however, was very disappointing. This condition was again traced to insufficient valve area and to excessive power-absorption by the cooling fan. Therefore we decided to build a cylinder having a detachable head combined with a cast-iron barrel. Such a design is illustrated in Fig. 6.

An aluminum head well covered with cooling fins and incorporating very generous-sized valves characterized this design. The valve seats were of aluminum bronze with a 0.003-in. shrink fit. The head was bolted to the cylinder barrel with six bolts pressing against a copper-asbestos gasket. Cooling air was directed to the exhaust port, then to the intake port and intake manifold. The valve-gear box was bolted directly to the upper surface of the cylinder-head in much the same way as in the conventional Franklin construction shown in Fig. 1.

Initial tests of this engine were discouraging as regards power output, yet they demonstrated that the cylinder cooled beautifully and that the joint between the cylinder-head and the barrel was a practical construction. Investigation showed that the low power of the engine was due to excessive power-consumption by the fan, low compression-ratio and overheating of the intake gases.

A careful study of cylinder temperatures promptly showed that the fan was delivering an excess quantity of air, since the engine temperatures were too low. Consequently, a new fan was designed which consumed 8.5 hp. at 3000 r.p.m. as against 19.7 hp. and resulted in cylinder-head temperatures well below 600 deg. fahr. The compression ratio was raised from 4.7 to 5.1:1, as absolutely no detonation was audible at any speed. The final investigation in the power study demonstrated immediately that the valve ports required reversing. Under continuous heavy load the cylinder-head absorbed a great quantity of heat, which flowed out into the intake manifold and thus excessively increased the gas temperatures. We found that, after a wide-open-throttle run at 2500 r.p.m. and then slowing down to 1000 r.p.m., the intake-gas temperatures would reach as high as 300 deg. fahr. With this in mind, the cylinder was next built as shown in Fig. 7, realizing that we were gambling with our ability to cool the exhaust valves properly.

The intake manifold in this design was removed absolutely from the airstream. However, the blast from the fan first struck the intake ports and then impinged on the hot exhaust-ports. The cylinder-head was again fastened to the barrel by six bolts, but the bolts were extended down through the barrel fins, with the nuts resting on a heavy boss. This construction was followed

because a detachable head that would not necessitate removal of the cylinder barrel was desired. Also, it left space at the top of the cylinder barrel for two extra cooling fins. Initial tests of this design showed the power output to be beyond expectations. Cylinder temperatures were low, yet two very discouraging features became evident: The valves were noisy because of excessive change of clearance, and the cylinder barrels persistently cracked just beneath the lower fin. After many attempts to eliminate the cracking, we decided to revert to the bolting method of Fig. 6, which had proved satisfactory.

Maintenance of Constant Valve-Clearance

The problem of maintaining constant valve-clearance was the most trying of any encountered during the development program. Thirty-four distinct steps were made before the final solution was obtained. Each step was particularly analyzed as to result, and with the fund of information thus accumulated it is now possible to calculate quite accurately the probable characteristics of an experimental valve-gear.

Early in this study we found that no particular effort was required to maintain constant valve-clearance on either valve alone, but when an attempt was made to compensate both valves together for all conditions of load and speed, serious difficulties arose. When the valve-gear was designed to maintain constant intake-valve clearance, the exhaust-valve clearance would decrease as much as 0.020 in. On the other hand, when the exhaust-valve clearance remained constant, the intake clearance would increase by 0.025 in. Either of these two conditions was, of course, inadmissible. Analyzing the various effects in the valve-gear set-up we had the following:

Increase of cylinder temperatures due to load, as a result of which the

(1) Exhaust-valve stem increased in length a maximum of 0.020 in.
(2) Intake-valve stem increased in length a maximum of 0.004 in.
(3) Exhaust-valve-stem expansion depended on intensity of flame, characteristics of valve guide and valve-guide boss, valve-stem length, heat conductivity of valve-seat and temperature of head metal backing up the seat, quantity of cooling air, arrangement of finning on the head, angle of valve seat, proportioning of metal in the valve head and, finally, expansion characteristics of the material.
(4) Intake-valve expansion depended on all items listed in (3) but to a less extent.
(5) Push rods expanded by 0.005 in., which equals 0.010 in. at the valve-stem.
(6) Cylinder assembly expanded vertically 0.030 in.; the barrel expanding 0.010 in. and the cylinder-head 0.020 in.
(7) Push-rod tubes increased in diameter by 0.007 in. and tended to offset partly the push-rod expansion.
(8) Distortion in valve-gear-mechanism parts represented an equivalent increase in clearance at the valve-stems of 0.009 in.

When each of the foregoing characteristics is studied, it is seen that constant valve-clearances in an air-cooled engine are to be obtained only after consideration for every effect.

The final solution consisted in mounting the valve-gear box on two studs marked *A* and *B* in Fig. 9. These studs are extensions of two of the bolts used for fastening the cylinder-head to the barrel. A third stud, *C*, which is a compensating stud, is the most important item in the design. It is screwed into the cylinder-head and rests on a shoulder that is level with the exhaust-valve seat. As the exhaust valve expands with increased temperature, it rises vertically and would take up all tappet clearance and remain open if it were not for the compensating stud, which rises vertically because of expansion of the length of aluminum beneath it. This

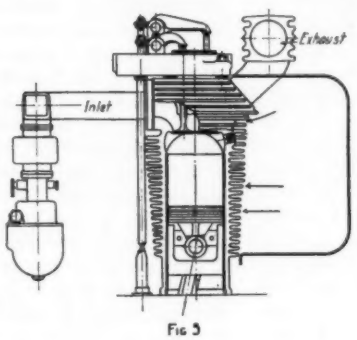


Fig. 5

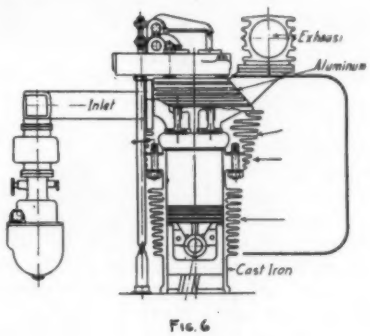


Fig. 6

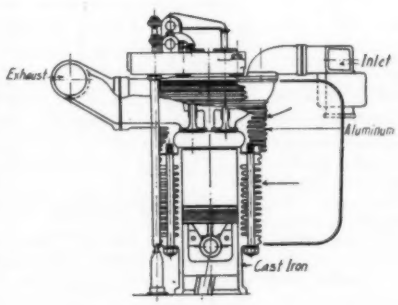


Fig. 7

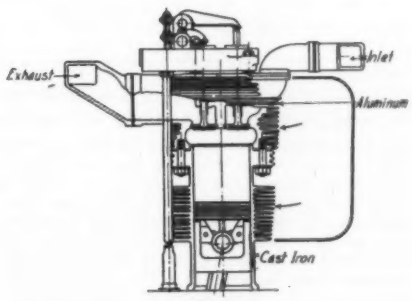


Fig. 8

Fig. 5—All-Aluminum Side-Blast Cylinder with Cast-Iron Liner. This Cooled Very Satisfactorily but the Fan Absorbed Too Much Power, and a Return to the Detachable Head Was Decided upon

Fig. 6—Design for Cast-Iron Cylinder-Barrel and Detachable Aluminum-Head. Initial Tests Showed That Low Output Was Due to Power Consumption by the Fan, Low Compression-Ratio and Overheating of Intake Gases

Fig. 7—Design with Gas Inlet on Air-Blast Side and Airstream Directed First against the Intake Port and Then against the Exhaust Port. Note Long Hold-Down Bolts for Aluminum Cylinder-Head

Fig. 8—This Design Is Similar to That in Fig. 7 but Shows a Reversion to the Short Hold-Down Studs as in Fig. 6 to Prevent Cracking of the Cylinder Barrels Directly beneath the Lowest Cooling-Fin

FURTHER SUCCESSIVE DESIGNS LEADING UP TO THE PRESENT EFFICIENT CYLINDER

vertical movement rocks the fulcrum of the exhaust-valve walking-beam and thus maintains nearly constant clearance at the valve. Table 1 gives actual valve-clearances as measured on an engine and which represent normal performance.

General Construction of Present Engine

Essentially, the cylinder construction shown in Figs. 8 and 9 and the valve-clearance-compensation idea just discussed are now used in the production engine shown in Fig. 10. This engine has six cylinders of 3½-in. bore and 4¾-in. stroke. It has a compression ratio of 5.3:1, although this does not by any means represent the maximum possible. The construction below the lower cylinder-flange follows normal practice. Cooling air is supplied by a 15-in. centrifugal blower mounted on the crankshaft. This air is directed to the various cylinders by a duct along the left side of the engine. The air leaving the cylinder is directed downward by another duct or housing so that no heat dissipated by the cooling system can enter the interior of the car.

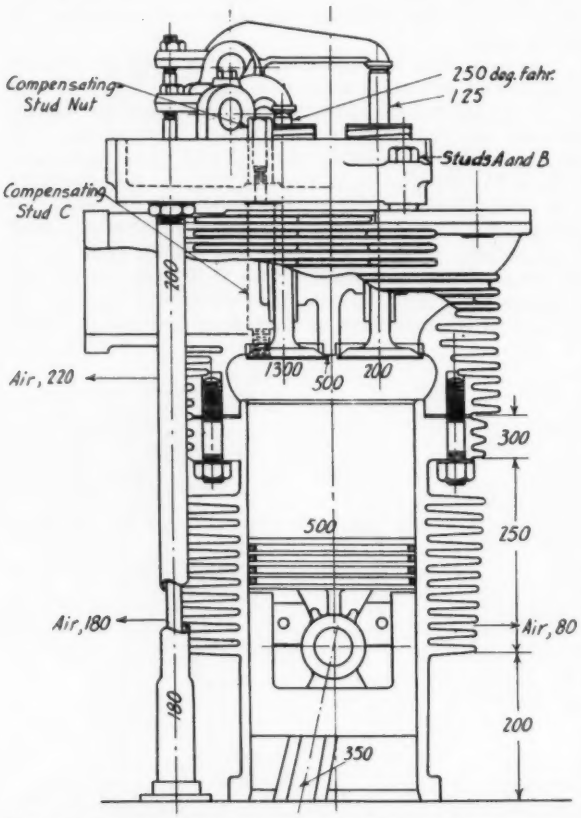


FIG. 9—FINAL DESIGN OF CYLINDER USED IN PRESENT ENGINE, WITH TEMPERATURES AT VARIOUS LOCATIONS

The Most Difficult Problem of Maintaining Constant Valve-Clearance Was Solved by Mounting the Valve-Gear Box on Two Studs, *A* and *B*, Which Are Extensions of Two Cylinder-Hold-Down Bolts, and Incorporating a Compensating Stud, *C*. The Latter Is Screwed into the Cylinder-Head and Rests on a Shoulder Level with the Exhaust Valve. As the Exhaust Valve Expands with Heat, Stud *C* Is Raised by Expansion of the Aluminum of the Cylinder-Head beneath It. This Vertical Movement Rocks the Fulcrum of the Exhaust-Valve Walking-Beam, thus Maintaining Nearly Constant Clearance at the Valve

TABLE 1—AVERAGE VALVE-CLEARANCES IN PRESENT DESIGN UNDER NORMAL OPERATION

	Exhaust Valve, In.	Intake Valve, In.
Engine Idling, 200 R.P.M	0.006	0.003
20 M.P.H., Level-Road Load	0.007	0.004
40 M.P.H., Level-Road Load	0.007	0.003
60 M.P.H., Level-Road Load	0.006	0.003
70 M.P.H., Full Load	0.004	0.002

Characteristics of the Production Cylinder

The cylinder-head is cast of Y alloy, either in a sand mold or a permanent mold, as this metal is the only material we have found that will long withstand continuous full-load operation and maintain tight gaskets and good conductivity between the valve seats and the cylinder-head proper. It also assures absolute tightness of the studs threaded into the head. Loose studs are very common with inferior materials.

Each cylinder-head has a total radiating area of 494.8 sq. in. This represents 7.22 sq. in. per cu. in. of piston displacement and 34.1 sq. in. per b-hp. output. Extensive investigations have shown that these relations are best suited for cylinders up to 3½-in. bore in which a temperature of 500 deg. fahr. is the maximum. This figure of maximum temperature is taken between the valves and is measured by a thermocouple 1/32 in. from the inner combustion-chamber surface. No doubt a temperature higher than 500 deg. fahr. could be permitted, but we feel that this is absolutely safe practice for aluminum-alloy heads. In this connection it may be of interest to mention that our maximum cylinder-head temperatures were lowered 50 deg. fahr. simply by bringing the exhaust and intake ports together by a metal thickness of ½ in. Although, offhand, this looks like a small change, it alone did the most to equalize temperatures throughout the head.

The cylinder barrel is of a good grade of cylinder iron alloyed with 1 per cent of nickel. It represents no unusual foundry practice except that extra precaution is taken to remove all flash from between the fins. The fins are cast on ⅜-in. centers and are rather deep. Each cylinder barrel has a total radiating area of 590 sq. in., or 8.6 sq. in. per cu. in. of piston displacement. Various cylinder barrels have been developed that combine cast iron with welded-copper fins, aluminum with ordinary cast-iron liners and aluminum with liners of high nickel-content. However, we have yet to see a cylinder that in all respects is an equal of the cast-iron barrel just discussed.

Cooling-System Construction and Performance

Next to the cylinder construction, the cooling system deserves most consideration. By cooling system is meant the cooling fan, the fan housing and the air ducts. In previous air-cooled engines the fan has always been a sore subject. It gloried in absorbing a large proportion of the power output. We feel, however, that this is past history in view of the performance of the present fan. This absorbs 4.2 hp. at 3000 r.p.m. and delivers 3920 cu. ft. of air per minute against a static head of 4 in. of water. This represents an air efficiency of 56.2 per cent, which is admittedly high. At 3500 r.p.m. the fan absorbs 6.7 hp. with a proportional increase in air delivered. These figures for power absorption represent the total power taken up in cooling the engine. We believe that this is as low as, if not lower

than, the power absorbed by fan and water pump on indirect air-cooled, or, as generally designated, water-cooled, engines of equal piston displacement.

Discussion of the characteristics of the centrifugal type of fan used may be desirable here, since automotive engineers are perhaps better acquainted with the propeller type. In general, three types of blade are used in centrifugal fans. They are straight, forward curved or backward curved, depending upon the limitation of design. For a given diameter of fan, the forward-curved blade will give the most pressure, as shown in Fig. 11. Any centrifugal fan has two distinct sources of pressure: first, centrifugal force resulting from rotation of the air within the fan; and, second, kinetic energy imparted to the air by its velocity on leaving the periphery of the fan. Before the kinetic energy of the air is serviceable, it must first be converted into potential energy in the form of static pressure. This is the duty of the fan housing, or scroll, as it is sometimes designated.

The resultant line *P* in each of the diagrams *A*, *B*, and *C* in Fig. 11 represents the actual velocity of the air as referred to the fan housing. The present production engine uses the backward-curved blade as shown in *B*. This fan is found to be much more efficient than those having either of the other blade types. The forward-curved type was used on the 1930 engine. It had a diameter of 12 in. and 55 blades, whereas the present fan is 15 in. in diameter and has but 32 blades. The first experimental fans having backward-curved blades had 66 blades, but blades were removed step by step until 32 was arrived at as the most practical number. Fans having only 12 blades were built and found to have the same efficiency as the fan with the number selected. We felt, however, that such a fan would lack sufficient rigidity to withstand speeds which at times might exceed 4200 r.p.m. Table 2 compares the performance of the present fan with that used on the 1930 engine, and Fig. 12 shows the 1931 fan beside last year's fan.

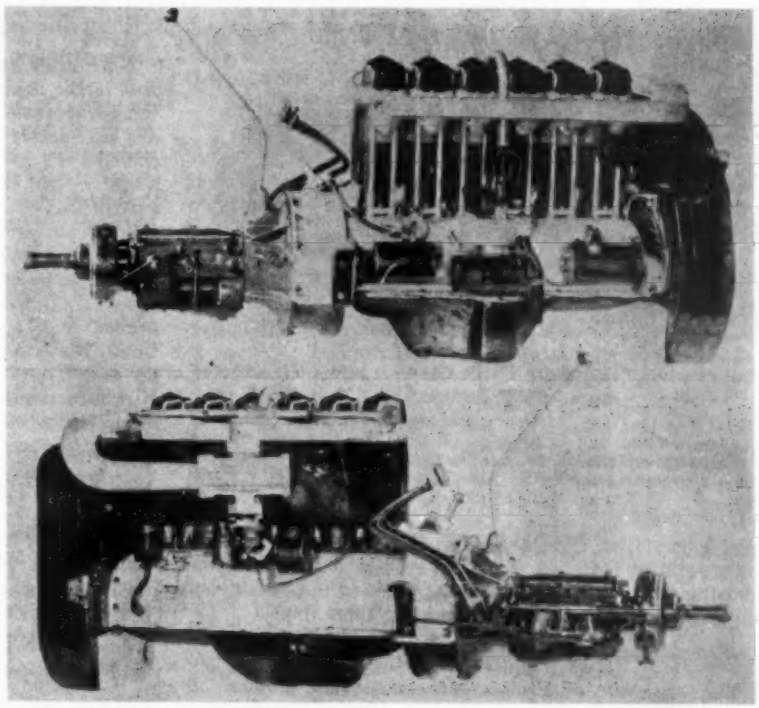


FIG. 10—RIGHT AND LEFT SIDES OF 1931 FRANKLIN DIRECT-COOLED ENGINE EMBODYING CYLINDER CONSTRUCTION SHOWN IN FIGS. 8 AND 9

TABLE 2—COMPARISON OF PERFORMANCE OF 1930 AND 1931 FANS

1930 Fan, 12-In. Outside Diameter, Forward-Curved Blades			1931 Fan, 15-In. Outside Diameter, Backward-Curved Blades		
Speed, R.P.M.	Power Absorption, Hp.	Air Delivered per Minute, Cu. Ft.	Speed, R.P.M.	Power Absorption, Hp.	Air Delivered per Minute, Cu. Ft.
1,000	0.32	1,230	1,000	0.15	1,310
1,500	1.10	1,850	1,500	0.52	1,960
2,000	2.50	2,460	2,000	1.24	2,620
2,500	4.80	3,080	2,500	2.36	3,270
3,000	8.50	3,700	3,000	4.20	3,920
3,500	14.50	4,320	3,500	6.70	4,580

The design of the air housing is fully as important as that of the fan itself. No laws can be stated for a most efficient shape, and if there were definite laws they could not be used, because of chassis limitations. The

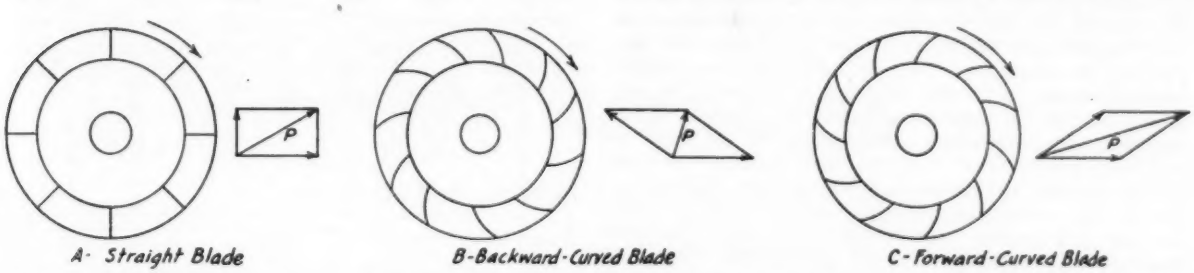


FIG. 11—BLADE FORMATION OF CENTRIFUGAL COOLING-FANS AND CORRESPONDING AIR VELOCITIES DELIVERED TO FAN HOUSING

The Fan Having Backward-Curved Blades (*B*) Is Much More Efficient than the Other Two Types and Is Used in the 1931 Engine. Kinetic Energy in the Air Leaving the Fan Is Converted in the Fan Housing into Potential Energy in the Form of Static Pressure, *P* in the Diagram at the Right of Each Fan

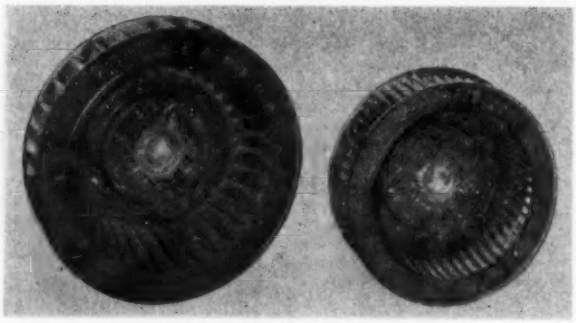


FIG. 12—COMPARISON OF FANS USED IN THE 1931 AND THE 1930 ENGINES

(Left) The 1931 Fan, Having Backward-Curved Blades, Is 15 In. in Diameter and Has 32 Blades. (Right) The 1930 Fan, Having Forward-Curved Blades, Is 12 In. in Diameter and Has 55 Blades. Table 2 Compares the Power Absorption and Air Delivery of the Two Fans at Different Speeds

performance of even the high-efficiency fan could be substantially bettered if it were possible to make the housing 1 in. deeper. However, outward appearance of our automobiles is very important in these days.

Heat Balance as Related to Design

The quantity of cooling air necessary to cool an engine sufficiently depends upon various design-factors, and these are variable and complicate any preliminary computations. Nevertheless, we have collected data through the development of these various engines to enable us to calculate the performance quite accurately before the engine is built. In these calculations we generally assume that the cylinder must be capable of dissipating 35 per cent of the total energy contained in the fuel, because we have measured the actual heat-balance on certain engines and found, for example, that an engine operated at 3000 r.p.m. gave the following results:

	Per Cent
Heat Equivalent in Useful Work	25
Heat Loss through Exhaust	37
Heat Loss through Cooling System	35
Unaccounted for	3
Total	100

Of course, once an engine is on the dynamometer, it is easy to check our design figures and, if necessary, to change the cooling system to give the desired results. For example, if 500 deg. fahr. is the maximum allowable temperature for valve-bridge metal and 400 deg. fahr. is the maximum on the cylinder-wall, the simplest method usually is to alter the fan blade until the air-flow is correct for these temperature conditions. If the cylinder has insufficient cooling-area, to attempt to cool it by excess air-flow is very poor practice. Excess air-flow means that excessive power will be absorbed by the fan and usually that the fan will be much too large for use in a chassis. Furthermore, the heat removed does not vary directly with the air velocity. We find that if we plot a curve of heat dissipated per unit area against air velocity, the resulting curve is very similar to the magnetization curve for iron; that is, the curve rises quite rapidly and then flattens off quite suddenly. The best practice is to work below the "knee" of the curve.

Uniformity of Cylinder Temperatures

One other factor that enters into this air-flow subject is the distribution of the air to give equal cylinder temperatures. A poor engine results if five cylinders are adequately cooled while the remaining one is undercooled. It is much better to raise all temperatures slightly and have the cylinders cooled equally. To assure this condition, our usual practice is to place four thermocouples in each cylinder barrel and at least three couples in each cylinder-head. The air housings are then altered until comparative locations show temperature differences of not more than 20 deg. fahr. Reference to Fig. 13 will show the air-housing construction. No deflectors are used, correct distribution of the air resulting from the shape of the side of the housing. How effective this method of air distribution has proved is shown by the following temperature figures taken at an engine speed of 3000 r.p.m.

Head Temperature between Valves, Deg. Fahr.

Cylinder					
No. 1	No. 2	No. 3	No. 4	No. 5	No. 6
500	510	508	510	490	490

Cylinder-Wall Temperature, Deg. Fahr.

Cylinder					
No. 1	No. 2	No. 3	No. 4	No. 5	No. 6
380	400	395	400	390	391

We do not want to convey the impression that equal air-distribution is essential, for usually, when cylinder temperatures are equal, the air distribution is far from equal. We have suffered some very disastrous results on new experimental engines where time was not taken to install thermocouples. Instead, air-flow was adjusted to give equal pitot-tube readings on all cylinders. When the engine was heavily loaded, certain cylinders froze, because of incorrect cooling.

Combustion-Chamber Characteristics

Very little work has been done to improve the shape of the combustion-chamber, since freedom from detonation has been very pleasing. However, experiments with four spark-plugs in each head have conclusively demonstrated that a spark-plug underneath the exhaust valve showed slight improvement in power.

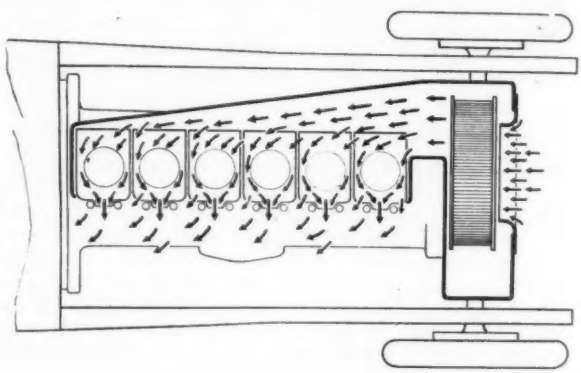


FIG. 13—AIR HOUSING AND AIR DISTRIBUTION TO THE SIX CYLINDERS

No Deflectors Are Used, the Cooling Air Being Distributed to the Successive Cylinders in Correct Volume and Velocity To Maintain Uniform Cooling as a Result of the Shape of the Side Housing

Incidentally, as much power was obtained with one spark-plug as with any combination up to four plugs. Our experience has been that, where more than one plug is necessary, the designer should know conclusively that one plug is poorly located.

With regard to compression ratio, one of our test cars was driven from Colorado Springs, Col., back to the factory in Syracuse, N. Y., with the same compression-ratio as was used in the Pike's Peak tests. This car had an 8.5:1 ratio and worked very satisfactorily with regular ethyl gasoline as bought at roadside filling stations. Although we do not recommend such a ratio, this shows that the combustion-chamber is good as regards detonation characteristics.

Performance of the Present Engine

Fig. 14 shows the output of the present engine as compared with the earlier construction shown in Fig. 1. Both engines have cylinders of 3½-in. bore and 4¾-in. stroke and were tested in exactly the same way. The curves reveal that the present engine develops a continuous brake-horsepower of 87, whereas the earlier powerplant developed 67 b. hp. However, the increase in peak power is perhaps not as interesting as the power at 3500 r.p.m. Here the output is increased from 48.25 to 85 hp., which represents a gain of approximately 76 per cent without a change in piston displacement. This increase in output results from:

(1) Better cooling characteristics of the cylinder
(2) Increased valve-areas
(3) Decrease in power absorbed by the fan
(4) Increased compression-ratio

To evaluate the effect of each change is rather difficult, as the changes are more or less interrelated. However, we are primarily interested in the final result; that is, the highest possible output from a practical engine, one that will withstand abuse and continue to perform day in and day out without constant adjusting.

Our experimental department has subjected this side-draft engine to all sorts of gruelling tests. One engine completed a 500-hr. test at 2000 r.p.m., full throttle, in a dynamometer with air entering the fan at 110 deg. fahr. When torn down for inspection, the engine was found to be in excellent condition; the exhaust valves were black, showing excellent cooling; and the valves were tight and capable of many more hours of operation before regrinding would be necessary. Another engine was operated in the dynamometer room with four other engines as heat generators. Steam was turned on in the radiators to make the room literally an oven. Yet this engine completed a 4-hr. run at 3000 r.p.m., full throttle, with the room temperature and the air entering the engine fan at 165 deg. fahr. It would have continued to run longer if the automatic sprinkler had not opened, flooding the dynamometer room and stopping the engine. This engine, when torn down, was found to be in perfect condition and was promptly reassembled for further testing.

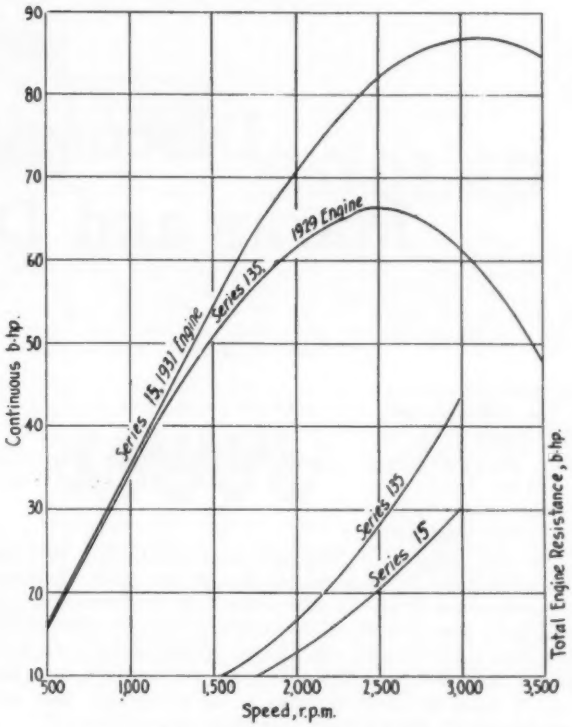


FIG. 14—POWER CURVES OF PRESENT SERIES-15 ENGINE AND SERIES-135 ENGINE

The Upper Two Curves Show the Brake-Horsepower Output Taken under Identical Conditions with Cooling Fan, Generator, Air-Cleaner and Muffler Connected and with Automatic Spark-Advance. The Lower Two Curves Show the Total Engine Resistance, Including Pumping Losses and Power Absorbed by the Fan. Both Engines Operated on Sunoco Blue Gas. Both Engines Have 3½ x 4¾-In. Cylinders and 274-Cu. In. Piston Displacement. The Compression Ratio of Series 135 Is 4.69:1 and That of Series 145 Is 5.30:1

Other engines have been installed in 7-ton Army tanks, which present the hardest service to which an engine can be subjected. The engine in a tank is located in the rear and is enclosed literally in a hot-box, obtaining its supply of cooling air through a small opening in the rear of the tank. It receives no benefit of velocity air-pressure caused by the movement of the vehicle. In spite of the severity of this service, the engine has performed satisfactorily under all conditions.

FRONT COVER: "Gold is where you find it."
Courtesy W. H. Miller

BACK INSIDE COVER: The Frank Kinzingers are very active in Classic circles in the Midwest.

BACK COVER: An interesting advertisement of the Ralph Hamlin Company. Courtesy of Anthony Giaimo.

Discussion of the Marks and Doman Papers

Following the reading of the Doman and Marks paper was a lengthy discusion presided over by Chairman Alex Taub, a Chevrolet* engineer. We have the full text of this discussion and regret that we cannot print it but it would fill the rest of this issue. Perhaps a few references from the discussion will be interesting, in general those present seemed quite openminded with the possible exception of the Chairman who seemed to take delight in trying to needle Mr. Doman. The following are extracts and are merely to show the general trend of the discussion, they are not necessarily in their proper sequence:

R. N. JANEWAY (Consulting engineer): The outstanding feature of this paper . . is the demonstration by the authors of the tremendous possibilities for improvement in air handling efficiency . . The data presented show that they have done a noteworthy job of blower development and air distribution. These results should provide those engineers who are fortunately concerned with the indirect air cooled engine with plenty of food for thought. I say, fortunately, because errors in air handling are far less noticeable in the so called water cooled engine.

LEROY V. CRAM (Assistant Chief Engineer, Chevrolet): In 1922 the General Motors Corp. was greatly interested in air cooling and I enjoyed the opportunity of putting into production an engine design . . that seemed to have great possibilities. I think that the cooling arrangement (Franklin) is the cleverest thing I have seen in a long time. (At this point Mr. Cram questions that the power absorption of the Franklin fan of 6.7 HP is as low as a comparative water cooler, then admits he does not know the power absorption of his own engine). After about 1½ years of intensive effort to put an air cooled engine into production . . this engine was to be checked on its dollar value against a water cooled engine of like power . . the Chevrolet company decided that it would better stick to water cooled engines . . because it could . . give the public more for its dollar. . . . [See Doman article on this point. Ed.]

J. A. ANGLADA (President, Anglada Motor Corp.): . . In connection with direct air cooling, I have recently been engaged in research on piston rings . . (Here follows a long description of his testing methods) . . the impression I received is that correctly designed air cooled cylinders provide a better fit for piston rings and remain truer to form diametrically and axially than the water cooled cylinders tested.

T. J. LITLE, JR. (Engineer, Holly Carburetor): Water is not ideal for cooling an engine. We have many instances of engines that run entirely too cool. Water cooled engines are frequently ice cooled in winter and steam cooled in summer. They (the Franklin people) need not be disturbed by the efforts of the water cooled engineer to build an air cooled engine, because he does not know how to build one properly; and possibly if the Franklin people started building a water cooled engine they would have as much trouble . . Seriously, it is no wonder that the man who spends years in building water cooled engines would not succeed perfectly in building an air cooled engine.

CHAIRMAN TAUB: If one could design an air cooled engine with fewer "bugs" than there are in the water cooled engine, we would certainly advocate the former type . . The Franklin engineers have been working on the air cooled engine for years, yet in 1929 they still had an unsatisfactory job, according to their own evidence.

MR. DOMAN: I take exception to Mr. Taub's last statement. Apparently all engineers feel that their cars are not satisfactory, for each year sees a crop of entirely new designs.

J. OTTO SCHERER (Consulting engineer): One respect in which I think air cooling is superior to water cooling has not been mentioned . . most water cooled cars are bad knockers after three or four years of life . . one reason is that the water jacket becomes coated with limestone, which is an efficient heat insulator . . an air cooled engine, no matter how old it is will maintain its cooling . . if anything goes wrong it is due to oil and dust clogging the fins.

MR. CRAM: I have had to use a hammer and chisel to get that oil and dust out.

H. C. DICKINSON (Bureau of Standards): I have been much startled to learn how bad the old Franklin engines were, because I drove one of them for a long time . . If the new ones are as much better than the old ones as this paper would indicate, I certainly should like one.

*We were amused to discover that the word **chevy** is a synonym for **worry**.—AHA.

COPPER CHEVROLET COOLED

In December of 1922, the Chevrolet Motor Company, a division of General Motors, announced what they described as "an important development in economical transportation", the Copper-Cooled motor. If this motor had been permitted to prove itself, and if it had fulfilled the fond hopes held for it, air-cooled cars might have been the rule today rather than the exception.

The product of two years experimentation and development in the General Motors Research Laboratory at Dayton, the Copper-Cooled Chevrolet was perhaps to be the opening move in a plan of Charles F. Kettering to make the entire G. M. line air-cooled.

However, this change-over was not to be, because shortly after the car was in dealers' hands, it was called back with an urgency and thoroughness that allowed almost no cars to escape. The returned machines were re-equipped with the conventional water cooled engines, which were still used in the standard Chevrolet line. Of those cars that did elude the hawk-eyed G. M. field men, only two known examples remain today. One of these can be seen in the Henry Ford Museum at Dearborn, and the other at the writer's Long Island Automotive Museum at Southampton. The second car was spirited away from the dog-catchers by Mr. Samuel Eliot, of Boston, and Professor Dean A. Fales of M. I. T., who preserved it until 1949 when it was turned over to the Museum. These gentlemen report that the little car ran very well for them. The Museum is also fortunate in having an extra engine which will become a cut-away display in the near future.

Naturally, the most important single feature of the car was the bonding of the copper fins to the cast iron cylinders in such a way that a full transfer of heat would be possible. A special machine was developed in Dayton for this purpose and the manufacture of the cylinder and fin assemblies was conducted there. The process was said in the catalogue to be patented. The cylinders were individual, being machined outside as well as in, to aid in uniform heat flow. They were mounted in pairs on the engine base with two cylinder heads, one for each pair. This placement of two cylinders close together required that the fin sizes be graduated to prevent interference between adjacent cylinders. Naturally, the cooling would be less efficient there than elsewhere, so the 1 7/16" intake valves were placed side by side near the short fins, also permitting the use of a Siamese intake manifold hook-up.

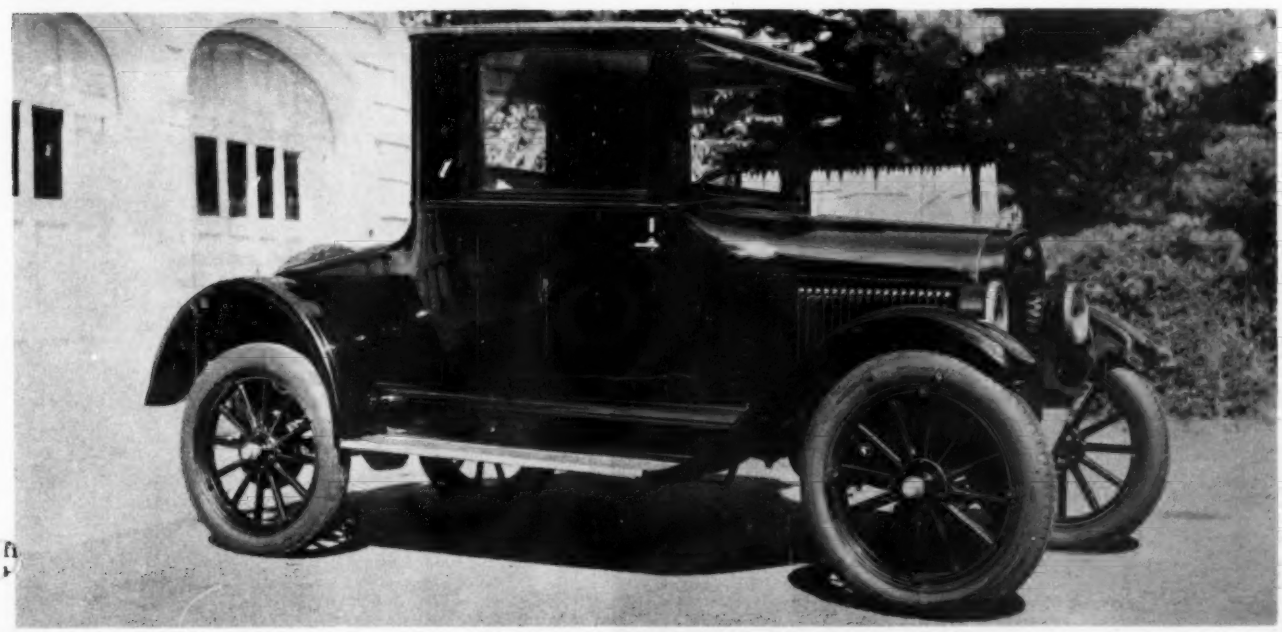
Accordingly, the exhaust valves (also 1 7/16") were placed opposite to the intakes, or where the fins were long and there was more room for air to circulate. According to information in "Automotive Industries", this arrangement resulted in equalizing the temperatures of different parts of the cylinders as determined by thermo-couples.

Otherwise the engine follows usual Chevrolet practice, being a four cylinder I-head design with equal bore and stroke (3½"), having 4 to 1 compression, and developing 22 brake power at 1750 r. p. m. The valves are operated from a single cam shaft by aluminum push rods, which combine the advantages of light reciprocating weight and an expansion factor much the same as that of the cylinders. The rocker arms operate on special graphite bronze bushings that do not require oiling.

The lubrication of the engine is by the pump and gravity system as well as splash. The gravity feed is to the three main bearings, while the connecting rod bearings are splash lubricated, a Chevrolet practice that continued for a long time. Little oil is allowed to remain in the base, however, when the engine is running.

The electrical system follows Chevrolet practice and is Remy throughout. A vertically mounted starter is engaged mechanically by a foot pedal. The generator is driven by the blower belt. The Remy distributor features an automatic spark advance, somewhat in advance of general automotive practice of the time.

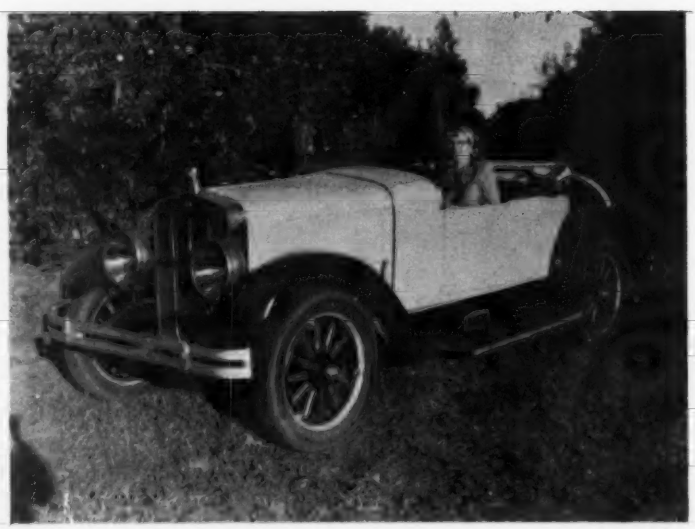
(Continued on Page 14)



Courtesy Long Island Automotive Museum

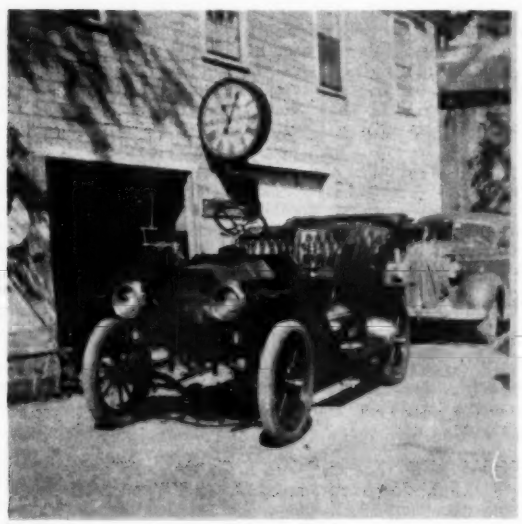
It is reported from California that Neal Kemble is working furiously around the clock to have his Series 7 in top form for the 1957 season.

Frank E. C. Bell an old time Franklin dealer of Calgary, Alberta, stopped at this picturesque spot to take a photograph just as the Franklin started its fifth trip around the clock. Yes, this 1927 had turned just 400,000 miles at this moment. Frank uses the car almost constantly, including a weekly commuting trip of 376 miles. We are setting aside a special award for the first Boudoir Pink Flopomatic Eight that ever sees four hundred grand.



Gladys Clavel at the controls. This picture arrived on the coldest day of February. That shadow down in the corner could be Emerson S, the little stinker who mentioned that it was 76° that morning in Wauchula!

We weren't there, strangely enough, and neither was Ed Haug who took this picture, but we doubt if Balboa's discovery of the Pacific could have produced a more entrancing shot. Here Bill and Gloria Miller are getting their first glimpse of their V-12. Bill's expression might be called smug, Gloria's can only be described as of one completely flabbergasted.



We will give an autographed copy of the Hagerstown Almanac to the first member who correctly identifies this Franklin without first writing Walter Myers for a hint. Yes, Junior, we said Franklin. John Burns is not eligible to compete!

A superbly restored Series 8 from the California stables of the HCCA Prexy, Herb Prentice. Could this be one of those California Chopped Custom Conversions we read so much about? Dechromed, too!

COPPER CHEVROLET COOLED

(Continued from Page 11)

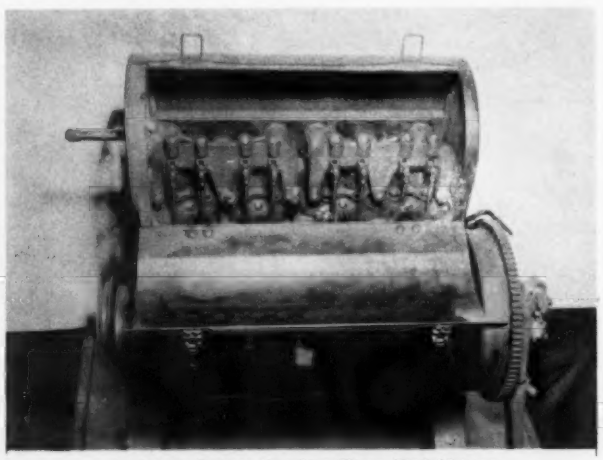
The fuel system is standard for the period. The ten gallon gasoline tank is at the rear of the car, requiring a vacuum tank to get the fuel to a one inch Carter Carburetor, which feeds into a restricted intake manifold. The reason for the restriction is to govern power and top speed to about 45 m. p. h.

The first step in the cooling process is the transfer of the heat developed in the cylinders to the copper fins, a process that is entirely automatic. However, to continue the calories in their flight, further arrangements must be made, as any owner of a cross engine Franklin will confess*. Towards this end, Kettering's boys enclosed the cylinders in a sheet metal shroud topped by a tunnel flaring into a centrifugal or squirrel-cage suction blower. Both the blower and the generator were driven by a V-belt that must have presented a special design problem because it is described as being of woven cord construction on the neutral axis with elastic material on either side. The replacement of this belt presents a problem to one who would motor in a Copper-Cooled Chevy today.

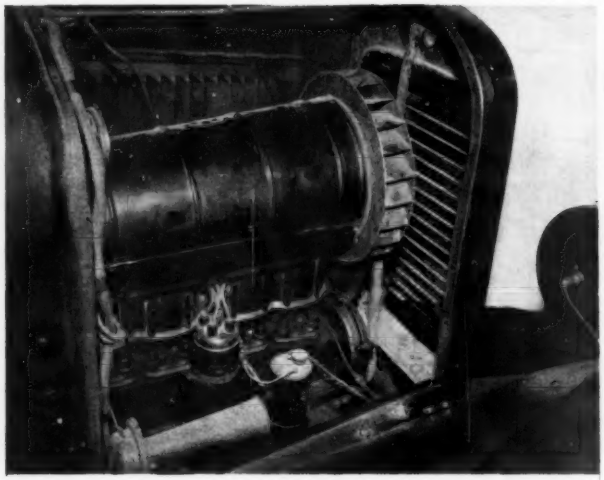
The chassis design follows the standard Chevrolet pattern with minor improvements and refinements. The drive is taken from the engine through a multiple disc clutch and three speed selective transmission with standard shift. This is followed by one universal joint to a torque tube drive shaft on to the differential and semi-floating rear axle. The front end of the torque tube is fastened to the central cross members, and the axle housings transfer the drive through the springs to the frame. The differential is mounted on large ball bearings. The ring and pinion gears are spiral cut; the latter is integral with the shaft.

The hand brake is on the drive shaft and foot brake on the rear drums, both external contracting. The drums are 11" in diameter and 1½" wide, which is sufficient for a 1670 pound car (in the touring model). Steering is controlled on the left through a screw and split nut gear by Jacox. Wheels are ordinary artillery type wood, with demountable rims and 30 x 3½ tires. Clincher tires were specified in the catalogue, but straight sides were actually furnished.

The catalogue copy writer said that the "spring suspension provides exceptional riding comfort". Only the fact that one can interpret this statement in two ways saves the fellow from being one of history's great liars. Actually, the car rides much like a western cow pony which has just been backed into a very large cactus. The suspension is simple, in the extreme, with four quarter-elliptic springs tapering down from the frame to the front and rear axles. The advantages claimed for this arrangement are (1) no shackles to wear out or squeak, (2) low unsprung weight, and (3) load carried close to the wheels. All that this proves is that theory should be tempered by practice.



Prototype Engine, Courtesy Henry Ford Museum



Production Engine, Courtesy Henry Ford Museum

The frame is simple and sufficiently strong. The side members are of ⅛" pressed steel channel, 4 7/16" by 1¾". There are four cross members: one in front, the rear engine legs, a square center cross piece, and a tubular member at the front of the rear springs. The rear end of the frame is open back of the rear axle to receive the back bumper, if fitted.

The Copper-Cooled Chevrolet was offered for the 1923 season at $200 more than the equivalent Superior water-cooled models. Bodies available were: two passenger roadster priced at $710, five passenger touring car at $725, five passenger sedan at $1060, and four passenger sedanette at $1050, and two passenger coupe at $880. The car at Southampton is of the last body style.

The Chevrolet of that day was a better finished and more luxurious car than the Ford Model T, and the Copper-Cooled cars were no exception. All the closed bodies were by Fisher with, to again quote the poet of the catalogue, "striking stream lines that suggest smooth speed". In all fairness, they looked pretty good beside the Lizzie.

After all this buildup, it is not unreasonable to ask: "What happened?" Why did the car so suddenly disappear? Was it really, as some unkind souls have suggested, a little stinker? Surely any automobile man can run off a list of awful cars which were built year after year. It would have to have been very bad indeed to be withdrawn for this reason so quickly.

At the present time, the writer cannot give an appraisal of the car from personal experience, although only one or two minor details (including the fan belt) remain to be finished up before the car will be ready for serious road testing.

On the other hand, the sudden withdrawal may have been for legal reasons. Did the method of bonding copper fins to cast iron cylinders infringe Franklin patents? Did a quiet delegation from Syracuse hint that the cost to G. M. of the Copper-Cooled engine might be far in excess of $200 a car?

In either case, the two remaining Copper-Cooled Chevrolets mark what might have been one of the most significant turning points in the development of the American automobile.

HENRY AUSTIN CLARK, JR.

*EDITOR'S NOTE: What "further arrangements"? We know of no cross engine running today with any modification to the cooling arrangements.

UNTANGLING AN OLD MYSTERY

There has never been one integrated history of the Chevrolet air-cooled passenger car. Many have written interesting morsels —some true and some quite false. Unfortunately, very few engineers responsible for the development of this interesting vehicle are living. Unfortunately, to the majority still living, the subject is so distasteful that it is seldom discussed.

If I recall correctly, during the summer of 1923, the H. H. Franklin Manufacturing Company purchased a 4-door Chevrolet air-cooled sedan. The channels followed in the procurement were never discussed. I only remember the desire to keep the ownership a secret from the Chevrolet Motor Company, a division of General Motors Corporation.

The car was quite naturally of great interest to the Franklin engineers. To me, a "near engineer," only the possibility of dynamometer testing appealed. I can recall, however, the engineers reported, "It has a great little engine. You can't overheat it." But the rest of the car was terrible. The car had the unpleasant faculty of often stopping in traffic and the starter refusing to crank the engine. The gear transmission often locked in gear for no good reason. Riding was extremely rough, probably due to the use of four quarter elliptic springs.

Eventually the engine was removed from the car and delivered to the research laboratory. I assure you the dynamometer installation was accomplished in record time. Quite naturally, the younger element of the engineering department was interested in performance.

While no data of the tests remain, my memory tells me that it produced approximately 25 b.h.p. at 2500 r.p.m., with accessories such as the fan, generator and exhaust system. Most important, the engine cooled perfectly during the continuous full throttle tests. Each cylinder used generous areas of copper sheeting finning for cooling. The industrial cast iron cylinders were turned smooth. Then a sheet of thin copper formed to make air passages was wrapped around each cylinder, with a sheet of brazing brass inserted between the cylinder and the copper finning. The assembly was then placed in an oven at 1400° F. where the copper finning became permanently attached.

This design appeared as an ideal method for attaching copper finning so several sets of cylinder assemblies were made up for Franklin Series 10C engines, General Motors' research department attaching the finning, with the understanding that a suitable licensing agreement could be worked out.

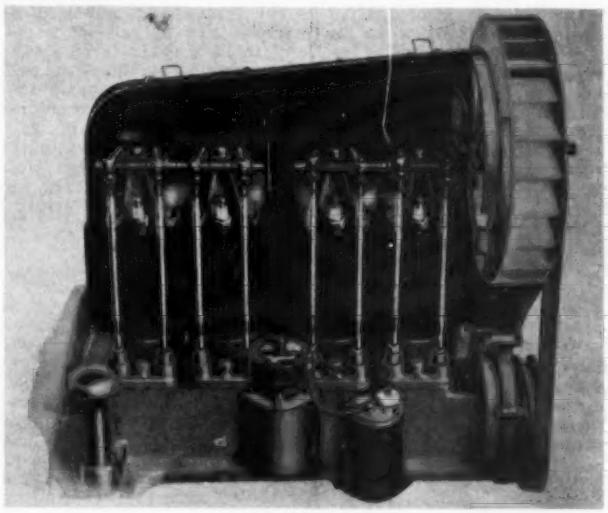
After dynamometer tests of the Series 10C engine with these special cylinders and proper road tests, the program was suddenly dropped for two reasons. First, no agreement could be reached on an equitable licensing arrangement. Second, it was found that cylinder bore wear was excessive. The high oven heat of 1400° F. annealed the cast iron so that it was just too soft.

The decision to drop the Chevrolet copper finning design resulted in the decision to cast into the iron cylinder 104 copper fins. I could write interesting tales of this development, as it also had many many problems, some of which were never solved. The one most commonly recognized was the tendency of the copper to develop cracks in the cast iron. The welded-on fins introduced in the 1929 Series 13 eliminated that problem, but were only used for a few months. The 1930 Series 14 side draft engine approached the cooling problem from an entirely different angle.

But, to return to the Chevrolet copper-cooled engine. The cooling air was supplied by a small sheet alminum fan driven by a belt. This fan pulled the air up the cylinder fin passages over the ports and out the fan shroud exit. In other words, it approached the cooling problem exactly opposite to that used by Franklin. Franklin pushed the air from the fan shroud exit over the cylinder ports and then down the cylinder fin passages.

As we look back over both the Chevrolet and Franklin designs, we certainly must state that both were in error. Neither design appreciated that 80% of the heat to be dissipated in each cylinder passes off through the head and 20% through the cylinder barrel or skirt, as it is often designated.

The Series 14 Franklin appreciated this fundamental of cylinder cooling. Therefore, only 2" H_20 was required at 3000 r.p.m. to push the needed air through the cooling passages. The Franklin engines from 1923 through 1928 required 10" H_20, and the 1929 (Series 135) demanded 12" H_20, and it wasn't cooled properly then. The bridge in between the valves reached 925° F. on a continuous run. The Series 14, 15 and 16 never exceeded 500° F.



From Chevrolet Catalog

It has been stated that Chevrolet built only 800 of the copper-cooled models. I do know definitely that an attempt was made to repurchase every one, but they were unsuccessful in obtaining the one purchased by Franklin. It was sold to a resident of Syracuse where it was put in every-day service.

No doubt Chevrolet could have found solutions to the mechanical short-comings of the copper-cooled model. Mechanical problems can be solved with effort. We have read that Mr. Knudsen,* then General Manager of Chevrolet, and Mr. Kettering, the sponsor of the copper-cooled design, differed on policy. Mr. Knudsen did not want the air-cooled model and refused to continue with it since he had just been made Manager of Chevrolet. The project was not shelved due to product deficiencies; it was not shelved due to patent pressure from Franklin. It was shelved because the Manager of Chevrolet lacked faith in the direct air-cooled principle.

CARL T. DOMAN

January 1, 1957

*From Kudsen's biography.—Ed.

Notes on the Financial History of the Company

by Harold M. Findley

Despite the undisputed quality of the company's products, the securities of the H. H. Franklin Manufacturing Co. were far from top-quality investments. During the 33 calendar years during which the company manufactured automobiles (1902 - 1934, inclusive), dividends on the common stock were paid in only 19 years—just over half; and this dividend record was much better during the first half of the company's corporate life than during the second half. Years of no return included not only such years of general Depression as 1930-34 but also the period 1922-27 when most concerns, especially in the automobile industry, were thriving.

Although H. H. Franklin Manufacturing Co. preferred stock paid regular dividends of $7 annually from issuance until August 1, 1930, this senior issue never sold as high as par ($100) after public records of its quotations were first made in 1924. Even in 1929, when Franklin produced and sold more cars than in any other year, the preferred stock sold as low as 70, returning a yield on purchase price of just 10%—a high rate even granting that interest rates for most corporate borrows were higher then than now.

The company was incorporated on December 12, 1895, but its articles of incorporation were significantly amended on November 14, 1901 when "automobiles and automobile parts" were added to the list of products to be manufactured. (The original charter had allowed the company to manufacture, sell, and deal in metal castings and metals.) It is probable that manufacture of automobiles was profitable from the beginning inasmuch as a cash dividend was paid in 1903, remarkably soon after a major undertaking. Dividends were also paid in the recession years 1907 and 1908 and in every other year from 1906 through 1921. No cash dividends were paid in 1912, but shareholders were rewarded by a substantial stock dividend. Other stock dividends were declared in 1910, 1916, and 1920. Cash dividends on the common stock were greater in 1915 than in any subsequent year save only 1929.

SERIES 9 LOOKED GOOD

From the viewpoint of the investment analyst, the high water mark of this company came in the 1919-21 period—fans of Series 9 take notice! The John C. Stein figures, published in Issue No. 4 of Air Cooled News, May, 1954, indicate that production in 1920 was second only to the all-time Franklin record of 1929. In 1920 Franklin accounted for .55% of total U. S. passenger car output whereas this percentage had declined by 1929 to .27% of the total due to the great expansion of the industry.

Not only did Franklin account for a larger share of the total auto market in 1919-21 than in future years but the company also earned a worth-while profit per car ($180 in 1919) and had behind it a long period of rapid growth and consistent profitability. Looking backward from 1921, the prospective investor would have seen a company which had manufactured cars for 19 years under the same management, had paid cash dividends in all but three years, and had paid large stock dividends on four occasions. A speculator, correctly anticipating rapid further gains from the auto industry, could hardly have selected a more logical place for his money than Franklin common stock. Few companies in the industry (certainly not General Motors or Ford) in 1921 could have boasted of so long or noble a record. Even in 1957, the majority of well-known companies in any industry have not had so good a record during the past 19 years.

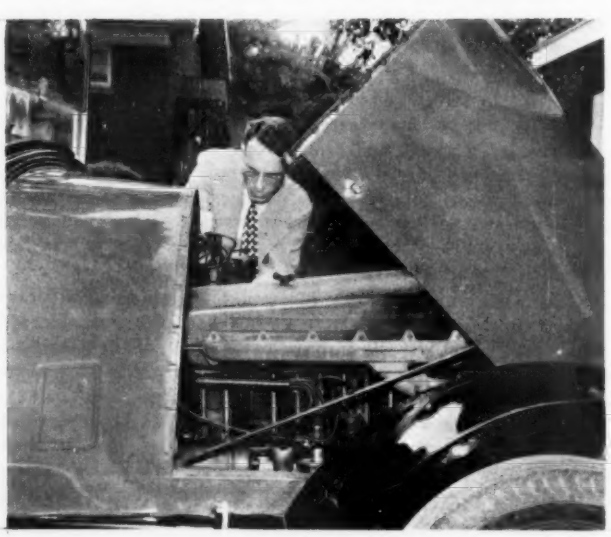
Z MIGHT HAVE SAVED THEM

With all the blessings of hindsight, the writer believes that failure of Franklin management to introduce the Model Z in 1922 was the major turning point of the company. General Motors, Ford, and Willys-Overland, the "Big Three" of 1921-28, had serious troubles during the short recession of that period but all three spurted ahead rapidly soon afterwards as the result of popularity of their four-cylinder models. The same thing could have been said about Dodge, Hupmobile, Maxwell, and, shortly thereafter, Hudson-Essex. Not only did Franklin fail to compete in this most rapidly growing sector of the market, but it appears that Franklin management was thereafter less aggressive about growth of any kind—for illustration, the value of the plant doubled between 1919 and 1920 (presumably because of additions and improvements which entailed considerable borrowing) but was never to exceed the 1921 peak by more than 6%. Employment of 4300 at the end of 1920 was never significantly surpassed. Last financing of any importance was the sale of $1½ million of preferred (with attached rights to purchase common) in 1920. The financial press of 1922 contained much reference to proposed financing to make possible the 4-cylinder Model Z; this car would have had much free advertising. However, the Commercial and Financial Chronicle of February 25, 1922, which outlines the terms of the $5 million of proposed financing, also contains in the same paragraph the ominous note that "Having on hand cars to meet seasonal demand beginning in March, the company is cutting production from 40 to 30 cars a day." If production of the regular line was being cut just at the beginning of the big Spring sales season, it might be difficult to raise $5 million for the launching of a new model! The writer guesses that such an attitude in the minds of investment men of 35 years ago was the basic cause of abandonment of plans for the Model Z, and might well have been the beginning of the final decline of the company.

SERIES 11 DID WELL

Devotees of Series 11 may be interested to note that 1925 was the only year in the published history of the company that earnings exceeded $2 million. The success of the 11A was also undoubtedly the major reason that the common stock rose to 43 and the preferred to 94, levels which were bettered only once thereafter. The conservatism of management, in not paying common dividends in 1925, was admirable—working capital had dropped 27% during 1924; inasmuch as writer owns a 10C, he assumes that this drop was caused by heavy development expenses for the 11 rather than any fault of the 10C model! Substantially all of this drop in working capital was made up during 1925, and the more than $6 million of net current assets on December 31, 1925 was never again equalled.

This failure of working capital to increase during four years in which earnings substantially exceeded dividends and plant account remained virtually unchanged, would hint that earnings were not very conservatively stated—perhaps some of the retooling and promotional expenses of new models were regarded by the company's accountants as capital expenses when they might better have been charged to operating expenses in a period when the public was beginning to demand distinctively new models each year.



THE LAST DECADE

For purposes of a critical study of this company during its last decade of corporate life, it seems fair to compare 1925 and 1929. Both years were exceptionally favorable years not only for Franklin but also for the automobile industry and for the U. S. economy in general. From a sales standpoint, Franklin showed a stronger gain than the auto industry as a whole during that five-year period—dollar sales increased 31%; production increased 68%, and Franklin registrations increased 50%, as compared with a 24% sales gain for the entire auto industry.

From a profits standpoint, the record for Franklin was not so good—although dollar sales were up 31%, dollar profits were down 44% between 1925 and 1929. Expressed another way, Franklin earned $235 per car produced in 1925 and only $70 per car produced in 1929. Comparable figures for the industry as a whole are of course not available inasmuch as Ford and a number of smaller companies were at that time privately owned and did not divulge complete figures. However, Packard seems an appropriate comparative yardstick inasmuch as both 1925 and 1929 were outstandingly good years for Packard and its products at that time were in the same price range as Franklin's. Packard showed net profits of $500 per car in 1925 and $565 per car in 1929—in the latter year, Packard's net per car was eight times that of Franklin!

Despite these indications of problems, the investor in automobile securities apparently took a rather favorable view of the Franklin situation and expected better things. Franklin was one of the relatively few automobile common stocks which sold higher in 1929 (all-time peak was 46¾ in June, 1929) than in the early or middle part of the decade. True, General Motors, Studebaker, Auburn, and Marmon were among the speculative favorites of 1929 and recorded new highs during that famous year, but Chrysler, Hudson, Willys-Overland, and Hupp (all strong contenders in those days and actively traded stocks on the New York Stock Exchange) did not better their earlier highs.

Hindsight of course indicates that Franklin stock was an excellent sale at its 1929 high, but it is also possible to see the viewpoint of the investor who purchased the stock at that time —regular dividends were being paid at the rate of $2 a year to return a yield of 4.28%, a rather good yield for a common stock in the summer of 1929; earnings that year were to be $2.47 per common share, fair coverage of the dividend; the preferred stock had been reduced gradually through the 1920's and there was no funded debt head of it; and the common stock's equity in the $19.2 million of market value of the company was more than 70%.

SIGNS OF TROUBLE

The glory that was 1929 in Wall Streets was not to remain for long. The Dow-Jones industrial average of 30 well-known big companies dropped from 381 on September 3 to below 200 before the end of October. Franklin stock dropped more than half of its June high. Although domestic registrations are ordinarily fewer than factory production, Franklin's 1929 registrations were 26% less than production, indicating that dealer inventories were probably dangerously high. Production for 1930 dropped nearly 60% from the 1929 level, but registrations dropped only to the level of 1928, the latter a better showing that the industry in general. But here again the profit showing was for Franklin much worse than the sales showing—1930's deficit was larger than the combined profits of the previous five years! Net working capital dropped to 20% of what it had been at the end of 1929.

As we all know now, the situation, both with Franklin and with American business in general, got worse in 1931 and 1932. The final chapter in the Franklin history is written by a simple paragraph stating that the entire assets of the company were sold to Franklin Motors, Inc. for $278,750 at bankruptcy sale, December, 1934; creditors received about 10½% of their claims. This same property which brought little more than a quarter of a million dollars had been appraised by the open market as a going concern for close to $20 million just 5½ years earlier and had then employed 2644 workers! After building up to the 1929 productian record of $26 million worth of cars over a period of 26 years, production had dropped to nothing in five years!

POST MORTEM

It seems futile at this late date to speculate as to whether the H. H. Franklin Manufacturing Co. would have survived if more common stock capital had been raised in the lush days of 1929, if Model Z had been introduced in 1922, if the Olympic had mades its appearance sooner, or if development costs of the 12-cylinder car had not drained cash during a difficult period.

The passing of the H. H. Franklin Manufacturing Co. near the bottom of the Depression was a big tragedy; but certainly not as big a tragedy as if there never had been this great company and its great product. Those of us who enjoy Franklin cars owe a tremendous debt of gratitude to the investors who had faith in this enterprise, especially to those who held their common or preferred stock until the end and lost their entire investment.

COMMON
COMMON
INCORPORATED UNDER THE LAWS OF THE STATE OF NEW YORK
H. H. FRANKLIN MANUFACTURING COMPANY
AUTHORIZED CAPITAL STOCK
PREFERRED 150,000 SHARES OF PAR VALUE OF $100.00 EACH
COMMON 600,000 SHARES WITHOUT NOMINAL OR PAR VALUE
This Certifies that
SAMUEL E. ASHER
THREE
fully paid
shares of the Common Stock of the H. H. Franklin Manufacturing Company
MAY 9 1921
In Witness Whereof, the corporation
has caused this certificate to be signed
SIXTH
day of MAY, 1921.
E. R. Barton
John Wilkinson
Original Issue

John Burns Column

With the full approval of Mr. Burns we are taking over his column to print this article furnished us by member Earl Becker. Mr. Burns says, "This is really a nice bit of information and is accurate in all respects."

The column in its usual form will be resumed with the next issue and REMEMBER, write direct to Mr. John L. Burns at 225 Reed Avenue in Syracuse, include a stamped envelope and send copies of the correspondence to the Editorial office for use of this column. Mr. Burns will answer all questions of a technical nature.

THE 1928 ENGINE

The Franklin is America's only air-cooled car, the present model, which is known as Series 12, "Airman Six," being the result of over a quarter century experience in the production of motor transportation units. The co-operation granted by the Franklin service department makes it possible to present maintenance data and service instructions which have been developed for this popular car. While this article applies to a specific series, the policy of the Franklin Automobile Co., Syracuse, N. Y., has been consistent improvement in accordance with personal transportation requirements rather than radical changes in design, and the instructions in general may also be applied to the previous series.

The engine accessories include Owen-Dyneto generator with third brush regulation and starter with Bendix drive, North East ignition system with Electro-lock and Champion spark plugs, Stromberg model T-2 carburetor, United air cleaner, Stewart vacuum system and Gascolator, full pressure lubrication system with Purolator oil filter and Ramsey or Whitney timing chain with manual adjustment. Chassis units include the Franklin standard laminated wood frame on the five-passenger models and pressed steel frame on seven-passenger models, Brown and Lipe single-plate clutch, three-speed transmission, tubular front axle, semi-floating spiral bevel rear axle, Spicer metal universal joints, full elliptic springs and Lockheed hydrulic internal four-wheel brakes.

The engine of Franklin design and manufacture, is also designated as series 12, and although of the same bore as series 11—3¼"—the stroke is 4¾", which is ¾" longer than the previous series. By increasing the piston displacement and engine speed, a considerable increase in power has been obtained. While the actual power output is not specified, this is estimated at 45 horse power at 2,500 revolutions per minute. The taxable horse power for this model is 25.23, and while weight has been added due to the larger engine and other features, the proportional increase in power is greater than the increase in weight, hence performance has been considerably improved.

By reference to Figs. 1 and 2, it will be noted the crankshaft is mounted on seven main bearings, being balanced for static and dynamic balance, and in addition carries counter-balance weights on each crank throw. Weights are secured to the crankshaft by two cap screws, and although the shaft is of the same size as the previous series, the increased bearing loads are more than balanced by the use of these counter-balance weights. The crankshaft is drilled for the distribution of oil from the main bearings to the connecting rod bearings. All bearing journals of the shaft are case-hardened, the claim being made that it is unusual to find it necessary to recondition the bearing journals even after 30,000 miles of service.

When bearing journals must be reconditioned it is necessary to grind these, as the journals are too hard to be reconditioned by the conventional reconditioning tool. Provisions is made for the adjustment of end thrust, which is taken on the front main bearing, adjustment being made by means of shims located between the thrust collar immediately back of the crankshaft sprocket and a shoulder on the shaft at the end of the bearing. The end play specified for the front main bearing is .003", while the center main bearings have an end clearance of .005" to .017" and the rear bearing .020".

The seven main bearings which support the crankshaft are babbitt lined and fitted with shims which permit adjustment. While a reasonable amount of adjustment may be made on these bearings, the general recommendation is to refit all bearings when bearing wear is not equal, as adjustment in this case would affect alignment. It is necessary to maintain perfect alignment for the crank shaft and for this reason line reaming is recommended when reconditioning is necessary. When reconditioning bearings it is good practice to inspect the bearing journals for roundness and also to make sure the oil leads from the main bearings to the connecting rod bearings are open. The recommended clearance in fitting bearings is .0015".

The connecting rod bearings are cast directly into the rod, the metal being spun into position to effect a solid bond with the rod. While connecting rod bearings are not fitted with shims, adjustment may be made by filing the lower cap. The diametrical clearance recommended is the same as that for the main bearings, .0015". The end clearance of the connecting rod bearing is .062". The camshaft is supported on four bearings, the center and rear bearings being interchangeable and held in position by means of set screws. All camshaft bearings require a clearance of .002", thrust being taken on the front bearing, which is held in position by a taper pin.

The Franklin "Airman" Six is provided with Duralumin connecting rods, which are 9½" long measured between bearing centers, and aluminum alloy pistons. The pistons and pins are the same as in the previous series, but the piston pins are chromium-plated, which is claimed to make them more resistant to wear and corrosion.

Pistons are fitted to the cylinders with a clearance of .025" at the top and .003" at the bottom of a tapered skirt. Piston, ring, or connecting rod replacement requires removal of the cylinders, as the piston will not clear the counter-balance weights on the crankshaft. Cylinders are cast separately, and access is gained without disturbing any of the remaining cylinders. Before fitting piston to the cylinder the bore should be tested for roundness with a suitable gauge, such as the Ames or Starrett. The practice of the Franklin service department is to recommend grinding and honing of cylinders. Regrinding is specified when the out-of-round wear is over .001", or if it should happen that cylinders are worn evenly, over .003".

Removing Engine

Owing to the special features of design the following method is recommended to remove and dismantle the engine. Remove the hood and upper air hood, also toe and floor boards. Disconnect battery and tape terminals. Disconnect Electro-lock cable. Remove hood front assembly. Remove headlamps, mud apron and bumper. These parts have to be removed separately. Remove sill finish strips, horn, and oil indicator tube. Disconnect carburetor, vacuum tank, starter, generator and ignition instrument. Disconnect speedometer cable, foot lever springs, and hand and foot lever connecting links. Remove brake and clutch lever extensions. Disconnect starter switch. Remove transmission gearshift lever. Remove engine guards, exhaust pipe and vacuum tank. Disconnect Purolator pipe. Disconnect universal driveshaft at rear flange and remove. Support engine in hoist. Remove engine to sill cap screws. Remove engine and place on stand. Spray clean engine and drain oil reservoir.

To dismantle engine, remove valve walking beam covers and pads, also spark plugs, carburetor, ignition instrument

assembly and bearing cap. Remove valve mechanism, intake and exhaust manifolds, cylinders, lower air hood and spark plug wire conduit assembly. Remove fan housing cover, fan, and fan housing. Next remove chain and sprockets, oil filler and indicator, starter, generator, oil reservoir, oil pump and oil screen. Remove transmission, clutch, and finally piston and connecting rod assemblies.

The piston pins are clamped in the connecting rod and have their bearing in the piston pin bosses of the piston. The clearance specified for this bearing is .0005". The piston is provided with four rings, all located above the piston pin. The three upper rings are plain snap rings, while the lower ring is a Tector oil control ring. The rings should be fitted to the piston so that they have a clearance of .0015" in the ring groove and an opening or gap of .015" when fitted to the clearance as specified an approximate compression pressure of 81 pounds at 1,500 revolutions per minute should be obtained.

Engine Timing and Valve Mechanism

While the valve mechanism of the Franklin follows conventional practice, the cylinders are cast with head integral. Valve grinding and carbon removal require removal of the cylinder. The valves are mounted in removable valve guides, which are pressed into position. Both intake and exhaust valve stems should have a clearance of .005" in their respective guides. The valve springs are retained by the conventional split cone entering into a recess cut into the valve stem. The adjusting screw for valve clearance is mounted in the end of the rocker arm, both valves being adjusted for a clearance of .010" with engine cold. Access to the valve springs and rocker arms is obtained by removing the pressed steel cover over each cylinder. The intake valve is of the tulip type and made of vanadium steel, while the exhaust valve is made of silchrome. Both valves have a lift of 5/16". When the valves are closed, the valve spring is under a pressure of 32 to 34 pounds.

The valve timing of the Franklin series 12 engine is as follows: Intake valve opens on top dead center and closes 57 degrees past bottom center. The exhaust valve opens 43½ degrees before bottom center and closes 25 degrees before top center.

A three-cornered chain drive, employing a Ramsey chain is used to drive the camshaft and generator and located at the front end of the engine. Fig. 5 is a diagram of the chain

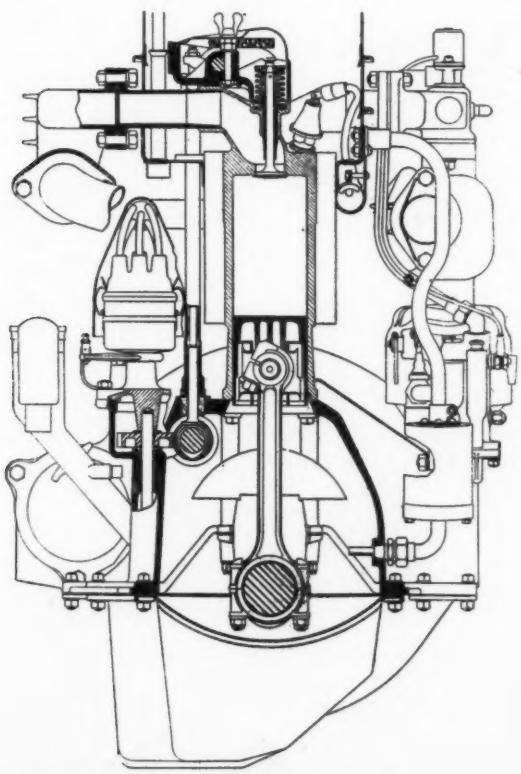


Fig. 1. Cross section of the Franklin engine

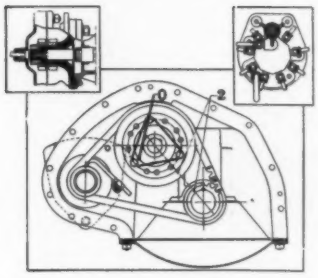


Fig. 5. Timing chain layout showing marking of sprocket in checking valve timing. The insert at the left shows the generator sprocket mounting which permits removal of generator without disturbing the timing. The insert at the right shows the oil pump

layout, while the inset at the left shows the generator sprocket mounting. This sprocket has its bearing on a hub fixed to the crankcase, while the generator sprocket hub and shaft are splined, which forms the means of driving the unit. This arrangement permits removing the generator without disturbing the sprocket or the engine timing. If, however, the timing may be lost, as is the case when dismantling the engine, this may readily be established by watching the sprocket marking. The camshaft flange to which the sprocket is bolted carires the figure "0." This figure will also be found on the camshaft sprocket. When these two parts are correctly assembled the two marks will be in line, as shown in Fig. 3. The crankshaft and camshaft sprockets are also marked with the figure "2." When the engine is correctly timed, pistons number 1 and 6 will be on their upper dead center and the figures "2" will b opposite each other as shown on the diagram. A line drawn through the centers of both shafts should pass through both figures. For an accurate check of timing bring piston No. 1 to top dead center on the compression stroke and adjust the valve clearance to .031". Turn the engine one revolution; then carefully move the crank until the .031" clearance in the valve is just taken up. A piece of tissue paper or feeler gauge can be used to determine this point. The □ mark on the fan rim should be from ¾" ahead to ¼" beyond the mark in the fan housing. The mark in the fan housing indicates the center line of the engine.

To adjust the tension of the chain, loosen the two cap screws holding the generator at the top and the nut on the front side of the flange at the bottom. Loosen the adjusting screw lock nut between the side of the generator and the crankcase. Remove the chain inspection hole plug and insert a stiff wire bent at right angles ½" from the end. This forms a hook gauge which should be worked under the chain. To tighten the chain, screw out on the generator adjusting screw until there is ⅜" to ½" up and down play in the chain. Tighten the lock nut on the adjusting screw and the cap screws and nut holding the generator.

Engine Lubrication and Ventilation

The engine is lubricated by pressure feed to all bearings and the timing chain housing. The Franklin system differs from other lubrication systems in that no pressure gauge is employed, oil being fed by a pressure pump to each bearing to be lubricated separately through a distributor, instead of a header supplying all bearings in parallel. The oil is forced from the crankshaft to the connecting rod bearings. The connecting rods are drilled so that a metered stream of oil is directed against the cylinder walls. Cylinders are also lubricated by spray thrown off from the connecting rods. Piston pins are lubricated by oil passages through the bearing bosses. The capacity of the lubricating system is six quarts. The oil gauge on the dash indicates the quantity of oil in the reservoir.

To provide crankcase ventilation, a lead from the air hood is connected to an air filter at the side of the crankcase. At the forward part of the crankcase is located a thermostatic valve which is connected to the filter. When the temperature of the oil is above 120 degrees this thermostatic valve is closed and the ventilation system does not function. When the engine is cold, the valve is open, and as the cooling system creates a pressure slightly above atmospheric, air is caused to enter the crankcase on one side and to leave near the rear on the other side through a combined relief pipe and oil filter. The oil filter is closed so that dirt cannot enter. The relief tube extends downward and discharges below the engine pan into air at atmospheric pressure. This ventilating system has proven so effective that the Franklin Company recommends changing crankcase oil every 1,500 miles in summer and every 1,000 miles in winter. The filtering medium in the air cleaner of the ventilating system should be removed and cleaned once every year, particularly at the beginning of winter.

Comments and Letters

Jerry Duryea with an impressive Staff of thirteen special editors, a Staff Photographer and an Art Director—no less than Peter Helck—always manages to turn out splendid issues of the ANTIQUE AUTOMOBILE. His latest number is certainly no exception to this fine record.

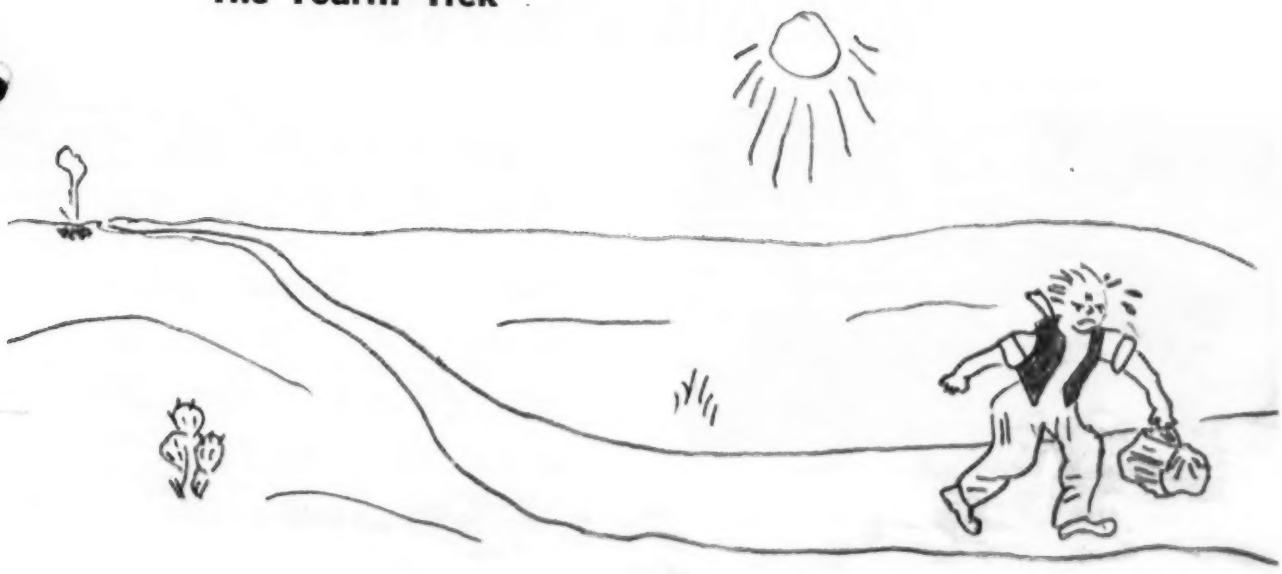
The December number of the HORSELESS CARRIAGE GAZETTE again featured a Holiday cover in full color. Of most interest to us was the back cover which showed the beautiful 1907 of member Marc Messinger. While no air coolers were in evidence on the front cover it was undoubtedly just about the finest cover we have ever seen. The scene was built about Ward Kimball's Hawaiian locomotive and was perfect in every detail. We offer our congratulations to Editor Fred Hayward, Photographer Mike Roberts and the rest of the Staff.

We wish to make a long overdue comment on the much improved standard cover of THE BULB HORN. We do not know what individual is responsible for this change, but added to a superior job of printing it has greatly improved the appearance of an always readable magazine. Editor Walter MacIlvain has about as many Staff members as Jerry Duryea and has the same Art Director—ACN badly needs an Art Director, maybe we had better get in touch with Norman Rockwell.

Kindly remove my name from your mailing list. Franklins, Franklins, all you write about is Franklins. In two years not a picture nor a single word about my VERDIS. Quincy Queemby, Shapeless, Ohio.

Its the best automotive club paper I have seen—outstanding even viewed from a professional standpoint. And it has made me so interested in the marque Franklin. Ove Haak, Stockholm, Spanga, Sweden.

The Fourth Trek



". . . but come if you have to walk"

It is none too early to start preparations for your trip to Syracuse "come August". Sometimes that tuneup or other planned job takes a lot more time than we think and you surely do want to arrive in a Franklin if possible. Try not to be like our friend above who doubtless forgot to renew the perhhy-platz before casting off from the West, BUT he is COMING nevertheless!

The Fourth Trek, August 16th and 17th, will follow the pattern that has been successfully established. Reunion and registration at the Hotel Syracuse on Friday morning, Annual Meeting that afternoon and the Smoker in the evening. Saturday the takeoff for Denman's Indian Isle, an ideal spot for our gathering, then luncheon in Brewerton just across the bridge from the island. Back to the hotel in plenty of time for a rest and nose powdering, then the cocktail party and the dinner. The Trek officially is only Friday and Saturday but each year more and more people arrive earlier and earlier on Thursday, you won't regret the extra unprogrammed time if you can make it.

Once again the Committee is all Syracuse with Ken Barton at the tiller, Johnny Burns, Dick Wright and the same old team as last year, they should do a first class job, especially as our Prexy, Chape Condit has now moved to Syracuse and the Committee will, no doubt, leave nothing unturned in trying to impress the "Brass"! So, don't lets miss this one.

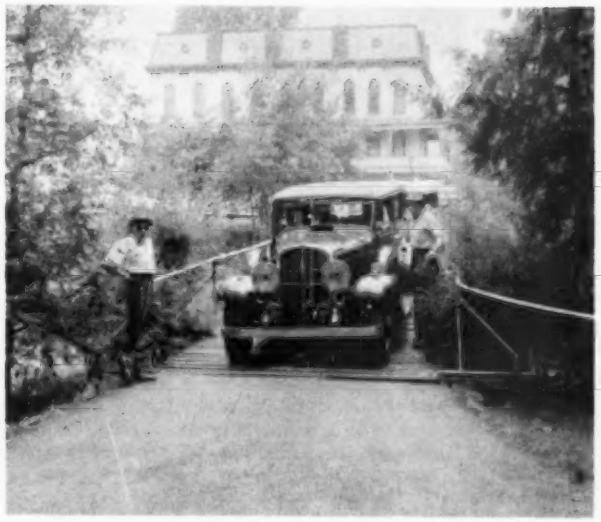
MEMO: The supplementary bulletin published by the Information Center is mailed only on request. If you desire this mailed to you order direct from Henry C. Courten, Box 127, Bethpage, New York. Please enclose a stamped envelope.

M. J. DURYEA

We have just learned of the passing of M. J. Duryea of Massachusetts.

He was not actually a regular member of this Club but was so interested in our progress and so helpful to us at so many times that we feel our Club has lost one of its truest friends.

A Familiar Scene to Trek Veterans



The Lucchesis Pass the Guards

SPARE PARTS

ONE FOR THE GIRLS

Dear Mr. Amick

Sorry To have delayed answering your letter. Life has been quite busy!

The famous hat that you mention is nothing but a straw cap with an elastic under the chin. I think the hat came from Jamaica or Nassau and is years old. It does not come off and it keeps the glare out of my eyes. Two important advantages.

Very sincerely
Jane Hinman

January fourth.

THIS IS THE FIRST

A meeting of much importance to the Club took place on January Twentieth at Selinsgrove, Pennsylvania. About fifteen members gathered at the home of the Robert Reeds to consider the formation of a Region. Much discussion and exchange of ideas finally resulted in the formation of the Susquehanna Region of The H. H. Franklin Club with a territory of the area with a two hundred mile radius of Harrisburg Pennsylvania.

These Officers and Directors will serve for the first year:

Nelson P. Reynolds	President
Karl W. Weather	Vice-President
Earl W. Becker	Secretary-Treasurer
Robert S. Reed	Director of Activities
Stanley D. Wilkinson	Assistant for Activities
Morzella Reynolds	ACN Correspondent

In addition to these the Board includes Dr. Edgar A. Dilks, George E. Domer, John Carl Foster and George Mikula.

The new Region will welcome HHFC members from any part of their territory. The Secretary, Earl W. Becker, of 2727 Grandview Avenue, York, will be glad to hear from you. They have already setup an ambitious schedule of activity for 1957.

We attended the first meeting of the new Region, along with about twenty-seven other members, at Dornsife, Pennsylvania on April Seventh. Space will not permit any report on this meeting, we are trying to squeeze this note in well after deadline. With this first meeting as a sample we think the Region will be a huge success.—ED.

CONGRATULATIONS

The Thomas McKean Memorial Trophy given each year by the Antique Automobile Club of America for excellence in automotive historical research was awarded for 1956 to member Miles S. Amick for his article, THE CROSS ENGINE FRANKLIN, published in the ANTIQUE AUTOMOBILE.

This marks the fourth award of the McKean Trophy to an HHFC member. The previous member winners were P. S. deBeaumont of Connecticut, Leslie R. Henry of Pennsylvania and Floyd Clymer of California.

Wilfred B. Harrison, New York member, was awarded the Thomas McKean Trophy for his 1909 Hupmobile. This trophy presented by the late Thomas McKean is given for the outstanding Tour car of the year.

AN AMENDMENT

President Condit reports the passage, effective December 16th, 1956, of a revision of the By-Laws providing that the Past President shall be a member of the Advisory Board for a period of two years following his term of office. During his second year on the Board under this provision the Past President shall have a vote only in the case of a tie. This amendment was proposed and passed to eliminate the possibility of a deadlock on important Club matters.

SON, YOU MIGHT TRY KOVELESKI

On the Glidden Tour this past summer when we reached the square of the little town of Jasper, Indiana, I pulled into the curb with Eleanor in the front seat beside me in the Simplex. I got out to get us some coffee and doughnuts and when I reached the car again Eleanor was having the giggles. It seems that a little boy of about seven was with his twelve year old brother thoroughly examining the car with their eyes sticking out in wonderment. They had a little argument and finally, very timidly, the little fellow got up his nerve and asked Eleanor, "Lady, where do you get the construction kits for these things?" Eleanor couldn't contain herself, but did succeed in explaining that these were real, genuine automobiles. After she was through, the bigger boy said to his brother, "See? I told you."—The Warren Weiants.

THE LITTLE FELLOW

Some of you who voted for Roosevelt, Theodore that is, might remember the little fellow on the center spread. He is BILLIKEN, The God of Things as They Ought to Be. Around a half century ago, cast in brnoze, he was a most popular radiator ornament. We wanted one so badly for the family car but our immediate forebear thought him too undignified.—AHA.

THE MARKET PLACE

Classified advertisements are free to members, subject to available space. Advertisements from non-members may be accepted, without charge, at the discretion of the Classified Editor. Illustrated advertisements may be accepted if accompanied by a clear glossy photograph and a check for $4.00.

Members are reminded that misrepresentation in advertisements may result in their being dropped from the Club rolls. They are further reminded that the publishing of their advertisements entails an obligation to answer all inquiries.

Henry C. Courten, Editor, Box 127, Bethpage, New York

LEADS

1931 Sport Convertible at Benton, north of Penn Yan, N. Y. (lead by Scott Bailey).

Free on request—color post card showing circa 1928 Franklin touring and 1905 cross-engine Runabout in front of Franklin agency. Send 3c stamp to Long Island Auto Museum, Southampton, N. Y.

Series 11A Sedan, running and in good shape, $125-200, also Model 153 in Boston (cheap). Contact Ron Andrew, 77 Grove St., Lonsdale, R. I.

1932 Victoria Brougham, 6 wire wheels, motor fair, needs glass and body work. Lynn Schantz, 25 Whitewood Rd., Toronto, Canada (lead by Jim Roberts.

1929 Model 130 fordor in perfect cond. Elliott Stinson, Lothrop St., Beverely, Mass. (lead by R. H. DeHart).

1929 Model 135 engine and transmission, complete or in parts. W. B. Crump, 7041 Thornhill Dr., Oakland 11, Calif.

"Going east in Sept. If any club member has an antique auto not weighing over 3000 lbs. that he wants sent east, I will trailer it to any spot on highway No. 66 from coast to coast." Jack Wadsworth, 264 W. Pamela Rd., Arcadia, Calif. Hi—7-9459.

1931 Franklin coupe convertible with six wire wheels, Benton, north of PennYan, New York. Contact L. Scott Bailey, 218 Dartmouth St., Rochester 7, N. Y.

WANTED

For 1907 Model G—crankcase and other motor parts. Sam Debolt, 732 Balzar, Reno, Nev.

For 1932 Series 16—reverse idler gear for 3-speed transmission. Have 12V Dyneto starter-generator for sale or trade. Elwood L. Butler, 177 Old Post Rd., Old Saybrook, Conn.

For Series 13—instruction book; will pay cash or swap a Series 10 book in good cond. Mike Cannon, 3705 Fairfield St., Metairie, La.

Pre-1920 Franklin.—Dr.W. H. Stadle, 607 Jennings Landing, Godnac Lake, Battle Creek, Mich.

For 1919 Franklin—any type of open body in fair cond. For 1930—dash clock. Earl W. Becker, 2727 Grandview Ave., York, Pa.

For Series 11A—Lion ornament, roadster windwings or brackets only. Max Crask, 6335 Graham Rd., Berkeley 21, Mo.

Series 9 engine or engine parts.—Al Mace, 24 Orion Ave., Groton, Conn.

For 1928 Airman—instruction manual.—B. J. Campbell, Industrial Arts Institution, Plains High School, Plains, Texas.

For Series 9—steering wheel, oil petcock extension, engine tire pump, intake manif., extension pipes, wire wheels, manual. —W. R. Cranker, 1961 Shenandoah Road, Toledo 7, Ohio.

For 1927—instruction manual.—Chester W. Dearinger, 428 Court St., Muskogee, Okla.

For 1910 Model D—two rear hub caps, maker's plate for dash, carburetor.—Frankie Watts, P. O. Box 185, Riverside Sta., Miami 35, Fla.

FOR SALE

1932 Club Sedan in running order, needs paint; also have some Franklin parts for sale. Herbert Briggs, 1337 So. Palomares St., Pomona, Calif.

The "one of a kind" 1931 "Pirate" sedan as shown in the classic issue of ACN. Will accept nearest offer to my $395 investment. Bob Kennedy, 43-42 Bowne St., Flushing 55, N. Y.

1932 Olympic Sport Coupe, six wire wheels, restortable; fair paint and upholstery, excellent tires. Make reasonable offer. Randall Hall, Menlo College, Menlo Park, Cal.

1929 130 Sedan—Excellent tires, top, upholstery and mechanical condition, with owner's manual. $200.—T. J. Berkfeld, 326 Orchid Ave., Corona Del Mar, Calif., Harbor 1759-W.

1929 Franklin, body and running-gear excellent and original. Also spare chassis for parts. Both for $150.—W. E. Ludwig, Genoa, Ill., Phone 4-5791.

1929 Speedster Fordor, excellent condition, new top and seat covers, original manual, wire wheels. Not driven since 1931. —Walter E. Johnson, 7 Roxbury Ave., Natick, Mass.

1927 Boattail Roadster—body No. 549 by American Body Co. Excellent top, upholstery, paint, tires, etc. Make offer.—Harold W. Coward, 632 Central Ave., Union Beach, N. J., Keyport 7-3454.

Three 21" split rims.—David T. Davis, 653 Washington St., Cumberland, Md.

Twelve-volt Dyneto motor-generator, good condition. Elwood L. Butler, 177 Old Post Road, Old Saybrook, Conn.

Franklin Brass Script—7" long $8.50, 13" long $10.50 (postpaid) made of 18 ga. polished brass. Satisfaction or money refunded. Arthur Evans, Rd. 2, Bangor, Pa.

Complete 135 chassis, will sell parts; Series 9B sedan, complet but rough. Max Crask, 6335 Graham Rd., Berkeley 21, Mo.

Sept 18th 1921

Forcing the well-known ant into a back place position

When you run out of gas on the road, it seldom enters your mind to tie a rope to the car and pull it to a gas station. But the stunt might be done, particularly if you owned a Franklin. Earnest Bria 19 years old 5'1" weighing 120 lbs tied two Franklin closed cars to-gether early last week and pulled them down the street for over a mile. He started tugging from a dead stop, got the

Franklins in motion, and pulled them down Figueroa street in 19 minutes flat. This simple but effective demonstration of the easy rolling ability of the Franklin attracted considerable attention while in progress, needless to say-